

# ***Euphonix Modular I/O Configuration Guide***

**Document Revision:** 2.0

**Release Date:** April 2008



**Euphonix, Inc.**  
220 Portage Ave.  
Palo Alto, California 94306 USA  
Phone: +1-650-855-0400  
Fax: +1-650-855-0410  
Web: [www.euphonix.com](http://www.euphonix.com)  
email: [info@euphonix.com](mailto:info@euphonix.com)



---

---

In the interest of continued product development, Euphonix reserves the right to make improvements in this manual and the product it describes at any time, without notice or obligation.

System 5, S-5, PatchNet, eMix, EuCon, R-1, Audio Deck, Studio Hub are trademarks of Euphonix Inc.

©2007 Euphonix, Inc. All rights reserved worldwide. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language in any form by any means without written permission of Euphonix, Inc.

---

**Note:** *This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*

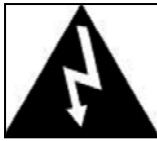
---

---

**Caution:** *Any changes or modifications made by the user that are not expressly approved by Euphonix could void the user's right to operate the equipment.*

---

# **IMPORTANT SAFETY INSTRUCTIONS**



The lightning flash with arrowhead symbol within an equilateral triangle, is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electrical shock to persons.



The exclamation point within an equilateral triangle, is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

- 1) Read these instructions.
- 2) Keep these instructions.
- 3) Heed all warnings.
- 4) Follow all instructions.
- 5) Do not use this apparatus near water.
- 6) Clean only with a dry cloth.
- 7) Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
- 8) Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wider blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- 10) Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- 11) Only use attachments/accessories specified by the manufacturer.
- 12) Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.



---



---

# Table of Contents

<b>Chapter 1: Product Description .....</b>	<b>9</b>
1.1 Modular I/O Frame .....	9
1.1.1 IO93 Modular Frame .....	10
1.1.2 IO94 Stagebox Frame .....	11
1.1.3 IO95 Modular Frame .....	11
1.2 MAD I, Control, and Sync Modules .....	12
1.2.1 MM934/MM934opt MAD I In/Out .....	12
1.2.2 MM935 MAD I In/Out .....	13
1.2.3 MM936 MAD I In/Out .....	13
1.2.4 SY982 Sync .....	14
1.2.5 SY983 Sync .....	15
1.2.6 FC972 Remote .....	15
1.2.7 WC984 4ch WCLK Out .....	16
1.3 Audio I/O Modules .....	16
1.3.1 AD914 4ch Mic Input .....	16
1.3.2 AD920 4ch Analog Line Input .....	16
1.3.3 DA921 4ch Analog Line Output .....	17
1.3.4 AD922 4ch Analog Line Input .....	17
1.3.5 DA923 4ch Analog Line Output .....	17
1.3.6 AD924 4ch Mic Input .....	17
1.3.7 DD908 4ch AES I/O (110Ω) .....	18
1.3.8 DD909 8ch AES Output (110Ω) .....	18
1.3.9 DD910 8ch AES Input (110Ω) .....	18
1.3.10 DD911 4ch AES I/O (75Ω) .....	19
1.3.11 DD912 8ch AES Input (75Ω) .....	19
1.3.12 DD913 8ch AES Output (75Ω) .....	19
1.3.13 DE901 Dolby D/E Decoder... ..	19
1.3.14 DE911 Dolby E Encoder .....	20
1.3.15 DE912 Dolby D+ Encoder .....	20
1.3.16 SD941 4ch SD Embedder/De-embedder .....	20
1.3.17 SD942 8ch SD Embedder/De-embedder .....	21
1.3.18 HD943 8ch HD/SD Embedder/De-embedder .....	21
<b>Chapter 2: Configuration .....</b>	<b>23</b>
2.1 Starting-Point Configurations .....	23

---

---

2.1.1 IO93 Modular Frame w/ Linked Audio Busses .....	23
2.1.2 IO93 Modular Frame w/ Discrete Audio Busses .....	24
2.1.3 IO94 Stagebox .....	25
2.1.4 IO95 Modular Frame as Local-Side MADi-over-Fiber Interface .....	26
2.2 Sample Configurations .....	27
2.2.1 Sample Configuration 1 .....	27
2.2.2 Sample Configuration 2 .....	28
2.2.3 Sample Configuration 3 .....	29
2.2.4 Sample Configuration 4 .....	30
2.3 Summary Reference Spreadsheets .....	31
2.3.1 Summary of Frames.....	31
2.3.2 Summary of Sync Modules .....	31
2.3.3 Summary of MADi Modules.....	32
2.3.4 Summary of I/O Modules.....	33
2.3.5 Cross-Reference Between MM934 MADi I/O and Audio Buss Jumpers .....	34
<b>Chapter 3: Product Data Sheets .....</b>	<b>35</b>
IO93 Modular Frame .....	36
IO94 Stagebox Frame.....	39
IO95 Modular Frame.....	42
MM934/MM934opt MADi In/Out .....	46
MM935 MADi In/Out .....	50
MM936 MADi In/Out .....	53
SY982 Sync .....	56
SY983 Sync .....	59
FC972 Remote .....	62
WC984 4ch WCLK Out.....	69
AD914 4ch Mic Input .....	71

---

---

---

AD920 4ch Analog Line Input .....	73
DA921 4ch Analog Line Output .....	75
AD922 4ch Analog Line Input .....	77
DA923 4ch Analog Line Output .....	79
AD924 4ch Mic Input .....	81
DD908 4ch AES I/O (110Ω) .....	83
DD909 8ch AES Input (110Ω) .....	85
DD910 8ch AES Out (110Ω) .....	87
DD911 4ch AES I/O (75Ω) .....	89
DD912 8ch AES Input (75Ω) .....	91
DD913 8ch AES Output (75Ω) .....	93
DE901 Dolby D/E Decoder... ..	95
DE911 Dolby E Encoder .....	97
DE912 Dolby D+ Encoder .....	99
SD941 4ch SD Embedder/De-embedder .....	101
SD942 8ch SD Embedder/De-embedder .....	105
HD943 8ch HD/SD Embedder/De-embedder .....	109

---

---

# List of Figures

2-1: IO93 Modular Frame w/ Linked Audio Busses .....	23
2-2: IO93 Modular Frame w/ Discrete Audio Busses .....	24
2-3: IO94 Stagebox .....	25
2-4: IO95 Modular Frame as Local-Side MADl-over-Fiber Interface .....	26
2-5: Sample Configuration 1.....	27
2-6: Sample Configuration 2.....	28
2-7: Sample Configuration 3.....	29
2-8: Sample Configuration 4.....	30
2-9: Summery of Frames .....	31
2-10: Summery of Sync Modules .....	31
2-11: Summery of MADl Modules .....	32
2-10: Summery of I/O Modules .....	33
2-11: Cross-Reference Between MADl I/O and Audio Buss Jumpers .....	34



---

# Chapter 1: Product Description

---

Euphonix Modular I/O is designed to add a new level of flexibility in I/O configuration to the Euphonix range of audio converters. The Modular I/O system offers several types of frames that can be fitted with a variety of I/O modules. This allows frames to be customized to exactly meet client requirements. For interface to the console, all signals are converted to MADI. Audio formats supported are remote control preamp, line level analog, AES/EBU, Dolby encoder/decoder, and HD/SD embedder/de-embedder. Other modules provide sync and remote control interface. Redundant multimode fiber connection for stageboxes is also supported.

The descriptions that follow are divided into the following groups of components

- **Modular I/O Frames**
- **MADI, Control and Sync Modules**
- **Audio I/O Modules**

*Note: The component settings descriptions are not all-inclusive. Only the most relevant settings for product understanding have been included here. See the manufacturer's data sheets for a complete listing of all options and switch settings.*

## 1.1 Modular I/O Frames

Euphonix offers several frame types, each specified for particular applications. Characteristics of the frames can be categorized as follows:

- **Backplane Space**

Module widths are either 1 slot or 2 slots (termed “4HP” per slot). Single sided frames contain a 19 slot (76HP) “rear-plane”. Double-sided frames contain a 19 slot “rear-plane” and an 18 slot (72HP) “front-plane”.

- **Power Supplies**

All frames contain dual-redundant power supplies. However, supply power capacity and mounting (built-in vs. removable) depends on the frame type.

- **Audio Busses**

---

Each audio backplane contains 32 passive stereo audio busses (64 total signal paths). Audio source and destination modules are connected to audio busses via physical on-board jumpers or via web-browser interface. Any audio buss may have multiple destinations but only a single source. Different frames have options to isolate audio busses in certain physical slot positions. This enables higher signal densities.

- **Control Buss**

Each frame contains a single control buss. The control bus interfaces to LAN via the FC972 Remote module. This enables console control of mic preamps and web-browser configuration of certain modules (other modules do not require any external control and do not appear on the control bus). The FC972 may be mounted in any frame slot and is assigned a unique IP address. Up to 16 “controllable” modules may be fitted into a given frame and each is assigned a unique ID via on-board switches.

- **Sync Buss**

Each frame contains a single sync buss that is shared by all modules in the frame. Several modules may act as the frame sync source such as the SY983 Sync (single and redundant configurations available) any MAD1 module (lock to incoming MAD1).

The sync source module(s) must be placed in any of the four red “reserved” slots located in the rear-plane (slot positions 1-4). These slots may also be used for other modules. If a MAD1 module is used a sync source, the frame must not contain any SY983/982 modules for proper operation.

### **1.1.1 IO93 Modular I/O Frame**

#### **General Description**

The IO93 is a 3RU double-sided frame with removable dual-redundant PSUs capable of delivering 5v@12A of usable power. The frame contains 19 rear-plane slots and 18 front-plane slots for modules. Rear-plane slots 1-4 are “reserved” for the sync source module(s). Other modules may be fitted here also. Sync and control busses are shared by all slots in the frame. Audio busses may be isolated between the front and rear planes via an interconnect PCB located in the unit

---

(configurable via DIP switched, some disassembly required to access).

### Connections, Power, Space, Weight

Power (IEEEEx2); PSU: autosensing (100~240vAC, 50/60Hz); input current (internal 5vDC rail at maximum load): 1.5A @ 99vAC, 700mA @ 207vAC; output: 5v@12A usable power, 3RU, front-plane module space: 72HP, rear-plane space: 76HP (typical module width: 4HP/8HP), audio connections will appear on front and rear in typical configurations. Weight: ~5.3kg.

## 1.1.2 IO94 Stagebox Frame

### General Description

The IO94 is a 3RU single-sided frame with built-in dual-redundant PSUs. The frame contains 19 rear-plane slots. Rear-plane slots 1-4 are “reserved” for the sync source module(s). Other modules may be fitted here also. Sync, control, and audio busses are shared by all slots in the frame.

### Connections, Power, Space, Weight

Power (IEEEEx2); PSU: autosensing (100~240vAC, 50/60Hz); input current (internal 5vDC rail at maximum load): 3A @ 99vAC, 1.5A @ 207vAC; output: 5v@20A usable power, 3RU, rear-plane space: 76HP (typical module width: 4HP/8HP), audio connections will appear rear only. Weight: ~5.3kg.

## 1.1.3 IO95 Modular Frame (for local-side redundant MADI-over-Fiber interface)

### General Description

The IO95 is a 3RU double-sided frame with removable dual-redundant PSUs capable of delivering 5v@12A of usable power. The frame contains 19 rear-plane slots and 18 front-plane slots for modules. Rear-plane slots 1-4 are “reserved” for the sync source module(s). Other modules may be fitted here also. Sync and control busses are shared by all slots in the frame.

---

For use as a local-side interface for redundant MADI-over-Fiber, four rear-plane “positions” of 3-slots each are audio isolated from the rest of the frame. These positions are as follows: slots 8-10, slots 11-13, slots 14-16, and slots 17-19. Modules placed in these positions share the frames sync and control busses.

The remaining 7 rear-plane slots (which includes the four “reserved” slots) may be isolated from the front-plane via an interconnect PCB located in the unit (configurable via DIP switched, some disassembly required to access).

### Connections, Power, Space, Weight

Power (IEEEEx2); PSU: autosensing (100~240vAC, 50/60Hz); input current (internal 5vDC rail at maximum load): 1.5A @ 99vAC, 700mA @ 207vAC; output: 5v@12A usable power, 3RU, front-plane module space: 72HP, rear-plane space: 76HP (typical module width: 4HP/8HP), audio connections will appear on front and rear in typical configurations. Weight: ~5.3kg.

## 1.2 MADI, Control, and Sync modules

### 1.2.1 MM934/MM934opt MADI In/Out

#### General Description

The MM934 contains a single MADI I/O and optional multi-mode fiber transceiver (MM934opt). The module features a master sync mode that allows it to derive the master sync source for the rack from its MADI input. MADI working modes set via on-board switches determine how it connects to the 32 stereo busses available on the backplane. All settings are done from on-board switches.

Working modes (label from MADI perspective). See **Chapter 2** for cross reference between MADI I/O and audio busses.

- <64 in>
- <56 in>
- <48 in, 16 out>
- <32 in, 32 out>
- <16 in, 48 out>

- <56 out>
- <64 out>

#### 96k Operation:

In frames operating at 96k sample rate, only the first 28 signals in a MADI stream are available. In these cases, <32 in, 32 out> working mode yields the best signal efficiency with 28 MADI inputs and 28 MADI outputs at 96k.

*Note: When used as the master sync source, the MM934/MM934opt MADI In/Out should only be removed from a frame after the frame has been powered down. Possible damage may occur to some I/O modules if the master sync source is removed from a live frame.*

#### Connections, Power Consumption, Width, Weight

MADI I/O (BNC x2). Multimode fiber: 62.5/125µm, 1310nm, one fiber strand per direction (SC x2) in MM934opt, ~350 mA (~500mA for MM934opt), 4HP. ~150g.

### 1.2.2 MM935 MADI In/Out

#### General Description

The MM935 contains a single coax MADI I/O. The module features a master sync mode that allows it to derive the master sync source for the rack from its MADI input. Certain settings are done from on-board switches such as device ID. Buss configuration is accomplished using a flexible crosspoint matrix configured via web-browser interface.

*Note: When used as the master sync source, the MM935 MADI In/Out should only be removed from a frame after the frame has been powered down. Possible damage may occur to some I/O modules if the master sync source is removed from a live frame.*

#### Connections, Power Consumption, Width, Weight

MADI I/O (BNC x2), ~350 mA, 4HP. ~150g.

### 1.2.3 MM936 MADI In/Out

---

## General Description

The MM936 contains a single MAD I/O connected via two multi-mode fiber transceivers for redundant MAD I-over-Fiber operation. The module is typically placed in an IO94 Stagebox frame and interfaces to the console via a MM936 and MM934 pair placed in an IO95 local-side interface frame. The module features a master sync mode that allows it to lock a frame to its MAD I input. Certain settings are done from on-board switches such as device ID. Buss configuration is accomplished using a flexible crosspoint matrix configured via web-browser interface.

*Note: When used as the master sync source, the MM936 MAD I In/Out should only be removed from a frame after the frame has been powered down. Possible damage may occur to some I/O modules if the master sync source is removed from a live frame.*

## Connections, Power Consumption, Width, Weight

Redundant multi-mode fiber: 62.5/125µm, 1310nm, one fiber strand per direction (SC x4), ~500 mA, 4HP. ~150g.

### 1.2.4 SY982 Sync (discontinued-replaced by the SY983 Sync)

## General Description

The SY982 contains an internal clock and can lock to external AES Sync, Word Clock, or Video signal. Internal sample rates are 44.1k, 48k, 88.2k, and 96k. The module features a sync redundancy mode which allows two modules, designated master and slave, to be fitted into a rack. If the master loses sync, the slave automatically takes over. SY982 Sync module(s) must be fitted into any of the four reserved slots on the rear-plane. All settings are done from on-board switches.

*Note: The SY982 Sync module should only be removed from a frame after the frame has been powered down. Possible damage may occur to some I/O modules if the master sync source is removed from a live frame.*

## Connections, Power Consumption, Width, Weight

---

Sync in (BNC), Word Clock out (BNC), ~300 mA, 4HP,  
~200g.

### 1.2.5 SY983 Sync

#### General Description

The SY983 contains an internal clock and can lock to external AES Sync, Word Clock, Video signal, or Tri-Level Sync. Internal sample rates are 44.1k, 48k, 88.2k, and 96k. The module features a sync redundancy mode which allows two modules, designated master and slave, to be fitted into a rack. If the master loses sync, the slave automatically takes over. SY983 Sync modules must be fitted into any of the four reserved slots on the rear-plane. On-board switches are used for certain settings including device ID. Web-browser interface via FC972 Remote provides access to module status and settings.

*Note: The SY983 Sync module should only be removed from a frame after the frame has been powered down. Possible damage may occur to some I/O modules if the master sync source is removed from a live frame.*

#### Connections, Power Consumption, Width, Weight

Sync in (BNC), Word Clock out (BNC), ~300 mA, 4HP,  
~200g.

### 1.2.6 FC972 Remote

#### General Description

The FC972 acts as a TCP/IP interface to the frame's internal communications buss. Frames with externally configured modules (remote preamps, 8-ch embedder/de-embedder, SY983 Sync) must have an FC972 Remote fitted. Configuration of this module via serial and/or web browser interface may be necessary. See the manufacturer's data sheet for details.

#### Connections, Power Consumption, Width, Weight

---

TCP/IP (RJ45), CAN Remote (RJ45) no longer used, RS232 (9pin DSub) for ip address configuration, ~300 mA, 4HP, ~200g.

### 1.2.7 WC984 4ch WCLK Out

#### General Description

The WC984 provides four workclock outputs derived from the frame's sync buss, regardless of the module being used as the master sync source. Sample rates from 44.1k ~ 96k are supported. This module is highly recommended from frames where sync-to-MADI is being used as the sync method. The module requires no settings.

#### Connections, Power Consumption, Width, Weight

Wordclock out (BNC x4), ~100 mA, 4HP, ~150g.

## 1.3 Audio I/O modules

### 1.3.1 AD914 4ch Mic Input

#### General Description

The AD914 provides 4 remote controlled preamps with 24 bit resolution and sample rates up to 96k. Preamps are controlled via Eucon interface or web browser interface via the TCP/IP network on the FC972 Remote. On-board switches are used to link the sources to the frame's audio busses and to set the device ID.

#### Connections, Power Consumption, Width, Weight

Analog input (MXLR x4), ~1300mA, 4HP, ~300g.

### 1.3.2 AD920 4ch Analog Line Input

#### General Description

The AD920 provides 4 analog inputs with 24 bit resolution and sample rates up to 96k. All settings are done with on-board switches including buss linking and analog reference level.



### Connections, Power Consumption, Width, Weight

Analog input (FXLR x4), ~850mA, 8HP, ~200g.

#### **1.3.3 DA921 4ch Analog Line Output**

##### General Description

The DA921 provides 4 analog outputs with 24 bit resolution and sample rates up to 96k. All settings are done with on-board switches including buss linking and analog reference level.

### Connections, Power Consumption, Width, Weight

Analog output (MXLR x4), ~650mA, 8HP, ~200g.

#### **1.3.4 AD922 4ch Analog Line Input**

##### General Description

The AD922 provides 4 analog inputs with 24 bit resolution and sample rates up to 96k. All settings are done with on-board switches including buss linking and analog reference level.

### Connections, Power Consumption, Width, Weight

Analog input (15p DSub), ~850mA, 4HP, ~200g.

#### **1.3.5 DA923 4ch Analog Line Output**

##### General Description

The DA923 provides 4 analog outputs with 24 bit resolution and sample rates up to 96k. All settings are done with on-board switches including buss linking and analog reference level.

### Connections, Power Consumption, Width, Weight

Analog output (15p DSub), ~650mA, 4HP, ~200g.

#### **1.3.6 AD924 4ch Mic Input**

## General Description

The AD924 provides 4 remote controlled preamps with 24 bit resolution and sample rates up to 96k. Preamps are controlled via Eucon interface or web browser interface via the TCP/IP network on the FC972 Remote. On-board switches are used to link the sources to the frame's audio busses and to set the device ID.

## Connections, Power Consumption, Width, Weight

Analog input (MXLR x4), ~1100mA, 8HP, ~300g.

### 1.3.7 DD908 4ch AES I/O (110Ω)

#### General Description

The DD908 provides 4 AES inputs (2 pairs) with SRC and 4 AES outputs (2 pairs) with 110Ω connection. Buss link settings are done with on-board switches.

## Connections, Power Consumption, Width, Weight

AES/EBU input (FXLR x2), AES/EBU output (MXLR x2), ~100mA, 8HP, ~200g.

### 1.3.8 DD909 8ch AES Input (110Ω)

#### General Description

The DD909 provides 8 AES inputs (4 pairs) with SRC with 110Ω connection. Buss link settings are done with on-board switches.

## Connections, Power Consumption, Width, Weight

AES/EBU input (FXLR x4), ~100mA, 8HP, ~200g.

### 1.3.9 DD910 8Ch AES Output (110Ω)

#### General Description

The DD910 provides 8 AES outputs (4 pairs) with 110Ω connection. Buss link settings are done with on-board switches.

### Connections, Power Consumption, Width, Weight

AES/EBU output (MXLR x4), ~100mA, 8HP, ~200g.

#### 1.3.10 DD911 4ch AES I/O (75Ω)

##### General Description

The DD911 provides 4 AES inputs (2 pairs) with SRC and 4 AES outputs (2 pairs) with 75Ω connection. Buss link settings are done with on-board switches.

### Connections, Power Consumption, Width, Weight

AES/EBU input (BNC x2), AES/EBU output (BNC x2), ~100mA, 4HP, ~150g.

#### 1.3.11 DD912 8ch AES Input (75Ω)

##### General Description

The DD912 provides 8 AES inputs (4 pairs) with SRC with 75Ω connection. Buss link settings are done with on-board switches.

### Connections, Power Consumption, Width, Weight

AES/EBU input (BNC x4), ~100mA, 4HP, ~150g.

#### 1.3.12 DD913 8Ch AES Output (75Ω)

##### General Description

The DD913 provides 8 AES outputs (4 pairs) with 75Ω connection. Buss link settings are done with on-board switches.

### Connections, Power Consumption, Width, Weight

AES/EBU output (BNC x4), ~100mA, 4HP, ~150g.

#### 1.3.13 DE901 Dolby D/E Decoder

##### General Description

The DD901 provides decoding of Dolby E and Dolby digital signals. Access to metadata parameters is via web-browser interface (FC972 Remote required). Certain settings are done from on-board switches such as device ID.

#### Connections, Power Consumption, Width, Weight

Dolby D/E input (BNC), Metadata out (9-pin DSub), 4HP.

### 1.3.14 DE911 Dolby E Encoder

#### General Description

The DD911 provides encoding of a Dolby E signal. Access to metadata parameters is via web-browser interface (FC972 Remote required). Certain settings are done from on-board switches such as device ID.

For proper operation, this unit must be locked to video sync via an SY983 Sync module.

#### Connections, Power Consumption, Width, Weight

Dolby E output (BNC), Metadata in (9-pin DSub), 4HP.

### 1.3.15 DE912 Dolby D+ Encoder

#### General Description

The DD911 provides encoding of a Dolby D+ signal. Access to metadata parameters is via web-browser interface (FC972 Remote required). Certain settings are done from on-board switches such as device ID.

#### Connections, Power Consumption, Width, Weight

Dolby D+ output (BNC), Metadata in (9-pin DSub), 4HP.

### 1.3.16 SD941 4ch SD Embedder/De-embedder (discontinued)

#### General Description

The SD941 can embed or de-embed 4 channels of audio to/from a single SD video signal as per SMPTE272M standard. Embedding/de-embedding may be applied to any of the four available 4-channel audio groups. Although the

---

---

module is capable of terminal-gear type functionality such as audio replacement, typically when used as an audio console interface it will function as either an embedder or de-embedder. All settings are done using on-board switches.

#### Connections, Power Consumption, Width, Weight

SD out (BNC), SD in (BNC), SD through (BNC), ~800mA, 4HP, ~300g.

### 1.3.17 SD942 8ch SD Embedder/De-embedder

#### General Description

The SD942 can embed or de-embed 8 channels of audio to/from a single SD video signal as per SMPTE272M standard. Embedding or de-embedding may be applied to any 8 of the available 16 channels of embedded audio via flexible cross-point matrix (FC972 Remote required). Certain settings are done from on-board switches such as device ID.

Although the module is capable of terminal-gear type functionality such as audio replacement, typically when used as an audio console interface it will function as either an embedder or de-embedder.

Additional features include 8 channel of audio delay, and a video test pattern generator.

#### Connections, Power Consumption, Width, Weight

SD in (BNC), SD Out (BNC x2), SD through (BNC), ~1000mA, 4HP, ~300g.

### 1.3.18 HD943 8ch HD/SD Embedder/De-embedder

#### General Description

The HD943 can embed or de-embed 8 channels of audio to/from a single SD or HD video signal (auto-sensing) as per SMPTE272M (SD) or SMPTE299M (HD) standard. Embedding or de-embedding may be applied to any 8 of the available 16 channels of embedded audio via flexible cross-point matrix (FC972 Remote required). Certain settings are done from on-board switches such as device ID.

Although the module is capable of terminal-gear type functionality such as audio replacement, typically when used as an audio console interface it will function as either an embedder or de-embedder.

Additional features include 8 channel of audio delay, and a video test pattern generator.

#### Connections, Power Consumption, Width, Weight

HD/SD in (BNC), HD/SD Out (BNC x2), HD/SD through (BNC), ~1000mA, 4HP, ~300g

## Chapter 2: Configuration

In this chapter, starting-point and sample configurations are illustrated. Several reference spreadsheets are also provided.

### 2.1 Starting Point Configurations

#### 2.1.1 IO93 Modular Frame w/ Linked Audio Busses

- 64 total source signals
- I/O modules may be placed in either plane
- Single SY983 module shown as sync source
- FC972 Remote shown. If required, fit in any slot.

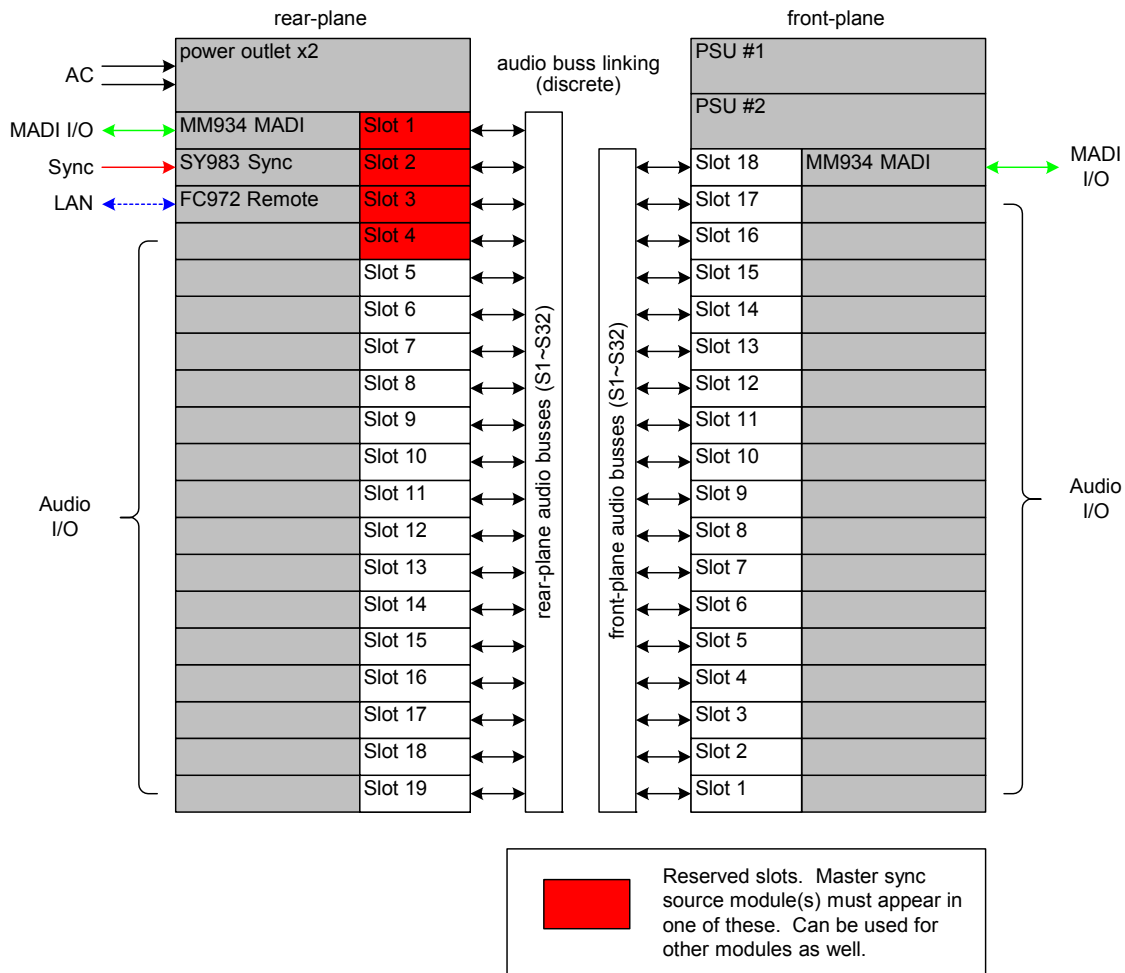


Figure 2-1: IO93 Modular Frame w/ Linked Audio Busses

### 2.1.2 IO93 Modular Frame w/ Discrete Audio Busses

- 64 total signals per backplane
- I/O modules must be fitted on the same plane as their associated MADI module
- Two MADI I/O entry/exit
- Single SY983 module shown as sync source
- FC972 Remote shown. Fit if required on either backplane.

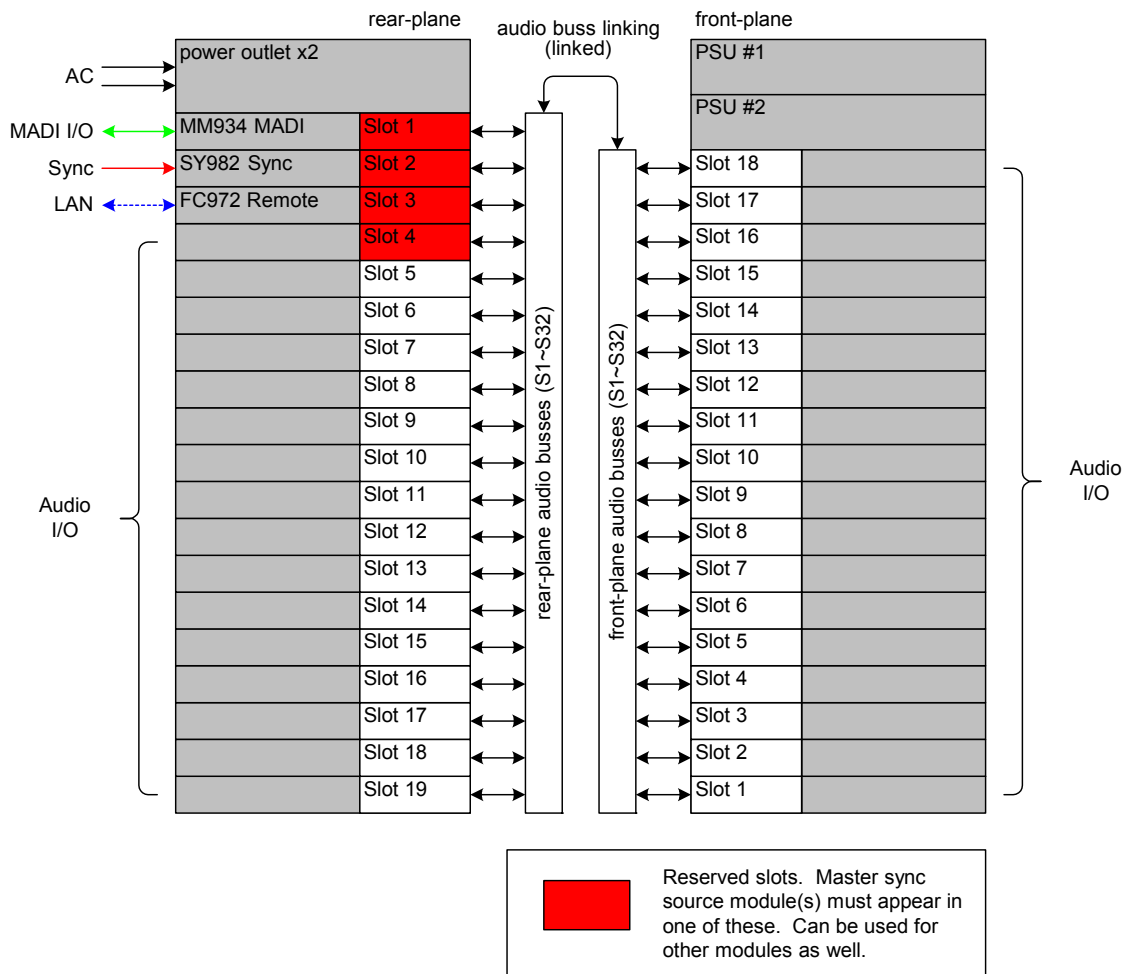


Figure 2-1: IO93 Modular Frame w/ Discrete Audio Busses



### 2.1.3 IO94 Stagebox Frame

- 64 total source signals
- MM936 MADI I/O (redundant MADI-over-Fiber) module shown as sync source (sync-to-MADI). This must appear in a red “reserved” slot
- FC972 Remote for remote preamp control may be placed in any slot

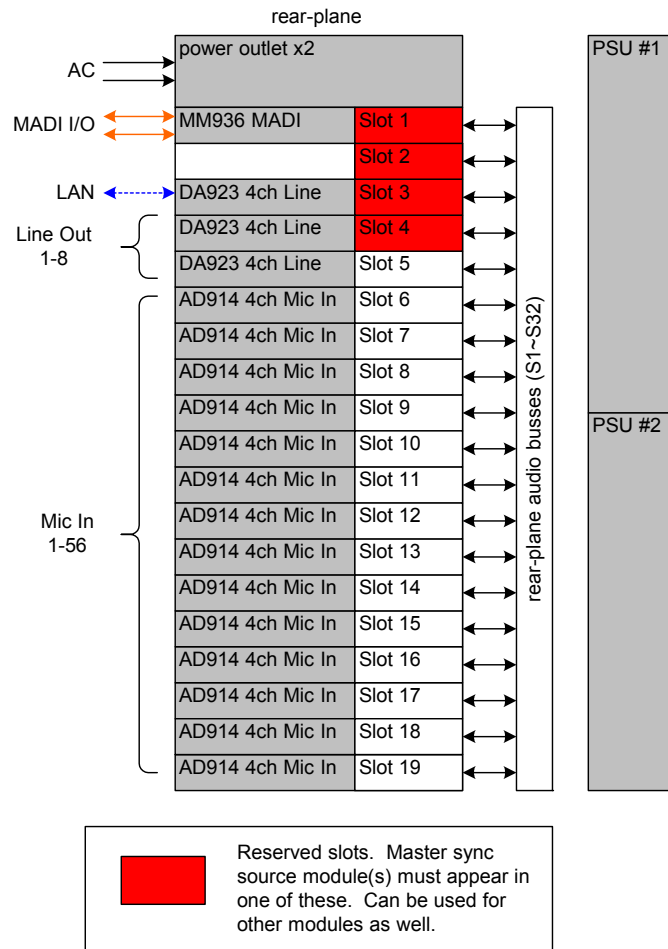


Figure 2-3: IO94 Stagebox Frame

### 2.1.4 IO95 Modular Frame as Local-Side MADI-over-Fiber Interface

- Four positions for local-side redundant MADI-over-Fiber interface modules
- Remaining slots may be used for local I/O with front and rear planes linked or discrete.
- Single SY983 module shown as sync source
- FC972 Remote may be fit in either backplane

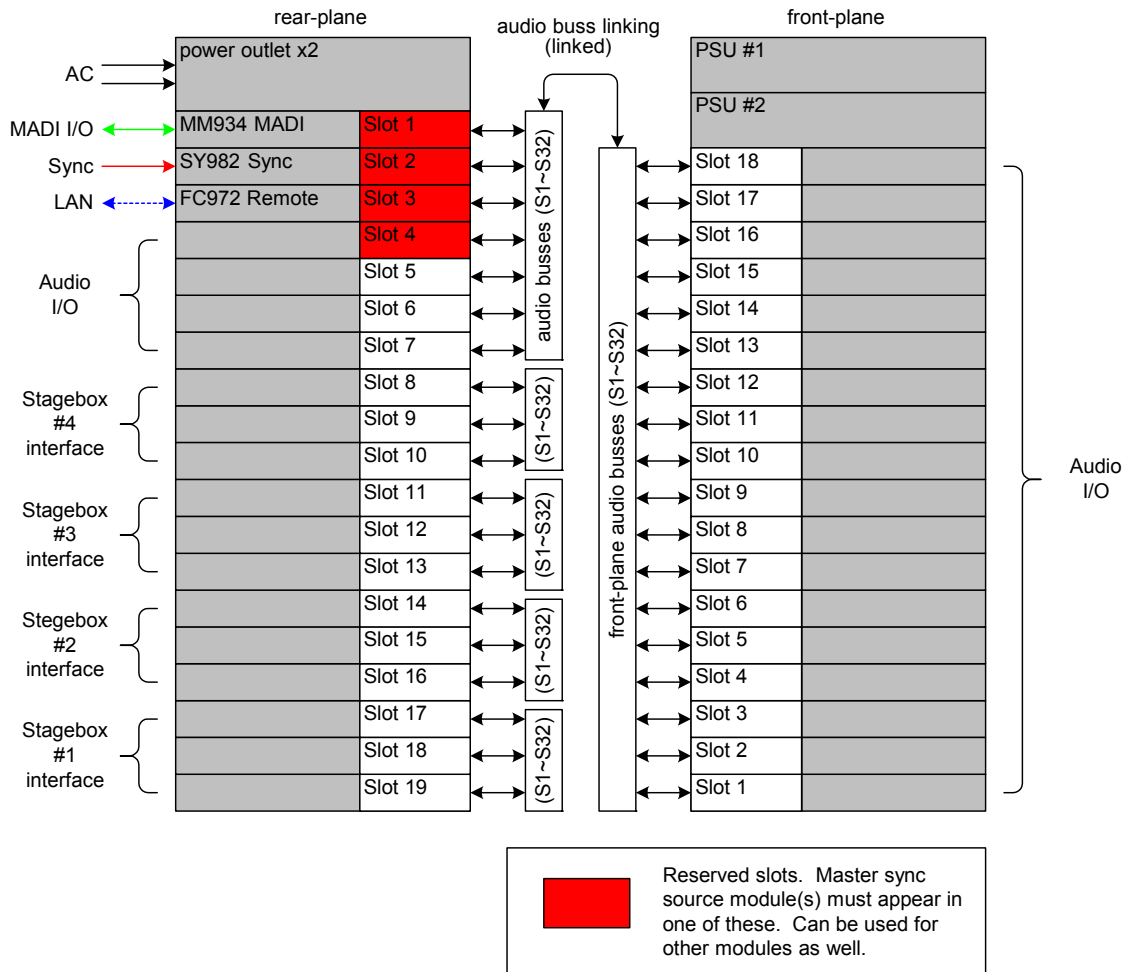


Figure 2-4: IO95 Modular Frame as Local-Side MADI-over-Fiber Interface

## 2.2 Sample Configurations

### 2.2.1 Sample Configuration 1: IO93 Modular Frame w/Linked Audio Busses

- Single SY983 Sync module as sync source
- MAD I working mode: <32 in, 32 out> = 32 audio outputs, 32 audio inputs
- 32 analog line inputs
- 16 analog line outputs
- 8 AES outputs (pairs)
- 4 wordclock outputs derived from the sync source
- Single MAD I I/O entry/exit

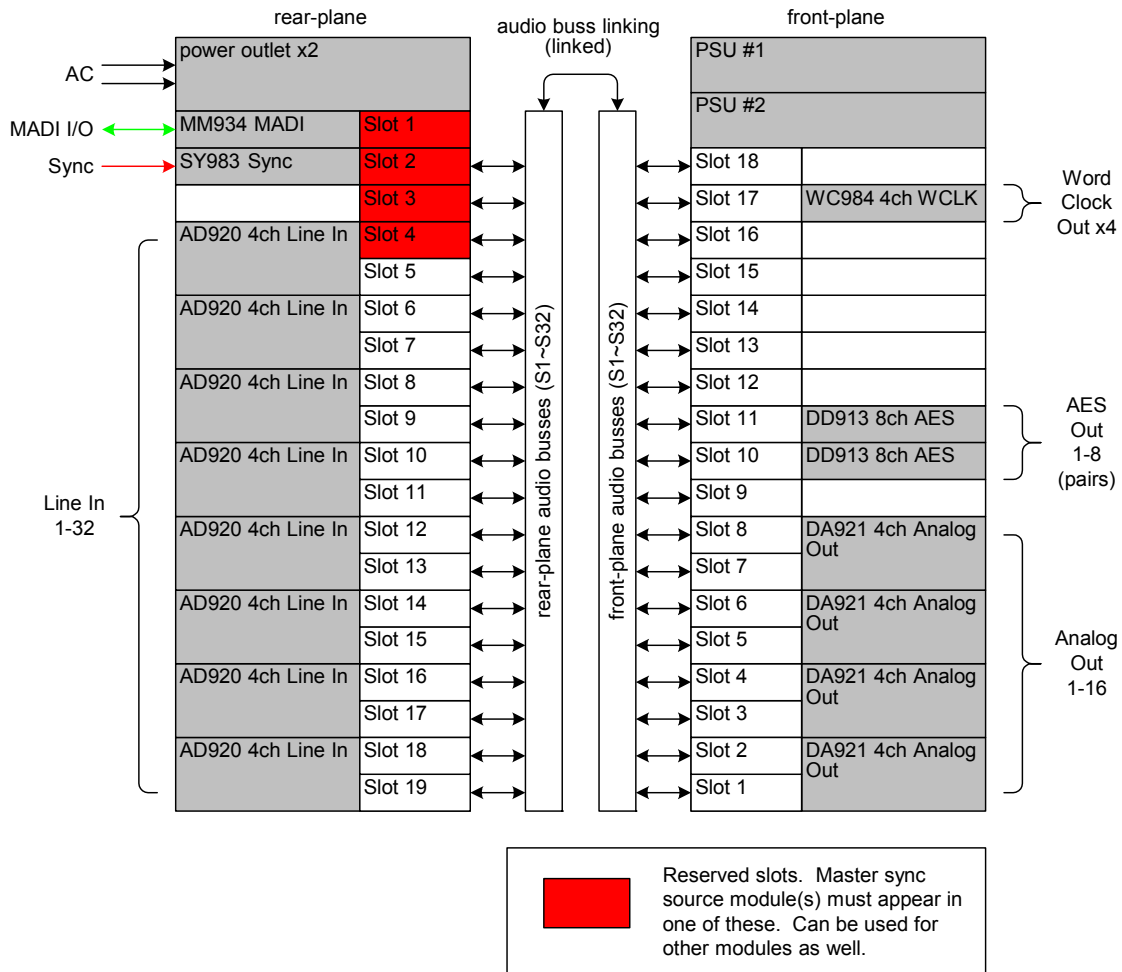


Figure 2-5: Sample Configuration 1

## 2.2.2 Sample Configuration 2: IO93 Modular Frame w/Discrete Audio Busses

- Single SY983 Sync module as sync source
- MADi working modes: Rear-plane MM934 set as <64 out> = 64 audio inputs. Front-plane MM934 set as <64 in> = 64 audio outputs
- 8 HD inputs (8 channels per video stream)
- 32 AES outputs (pairs)
- FC972 Remote required for HD943 configuration
- Single MADi I/O entry/exit

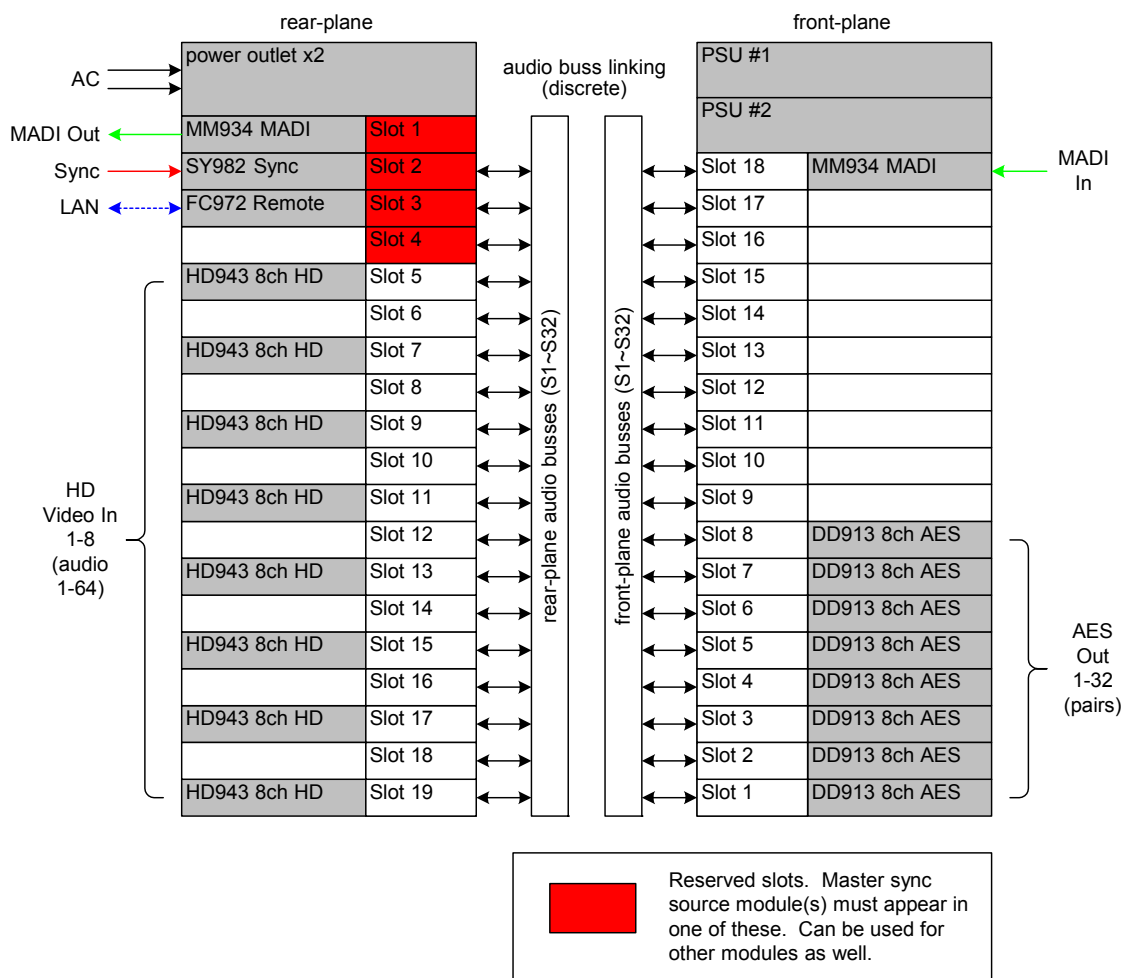


Figure 2-6: Sample Configuration 2

### 2.2.3 Sample Configuration 3: IO94 Stagebox Frame

- MM936 MAD I/O set to “sync-to-MADI”
- MADI config set using flexible crosspoint matrix via web-browser interface
- 56 mic inputs
- 8 analog line outputs
- Single MADI I/O entry/exit
- FC972 Remote not required for remote preamp control and MM936 MADI configuration.

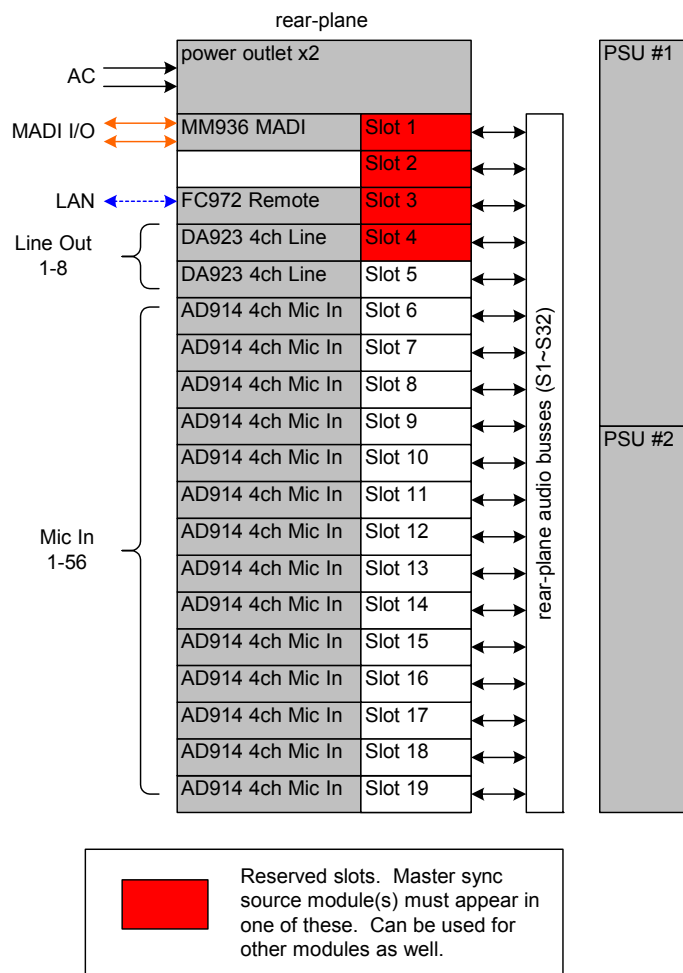


Figure 2-7: Sample Configuration 3

### 2.2.4 Sample Configuration 4: IO95 Modular Frame as Local-Side Redundant MADI-over-Fiber Interface

- Single SY983 Sync module as sync source
- MM936/MM935 MADI pairs fit to interface to four redundant MADI-over-Fiber stageboxes
- FC972 Remote required to configure MM936 MADI
- Additional slots used as local I/O (single MADI entry/exit via MM934 fit into rear-plane slot 1). Two MADI I/O entry/exit
- 16 AES inputs (pairs) as local I/O
- 16 AES outputs (pairs) as local I/O

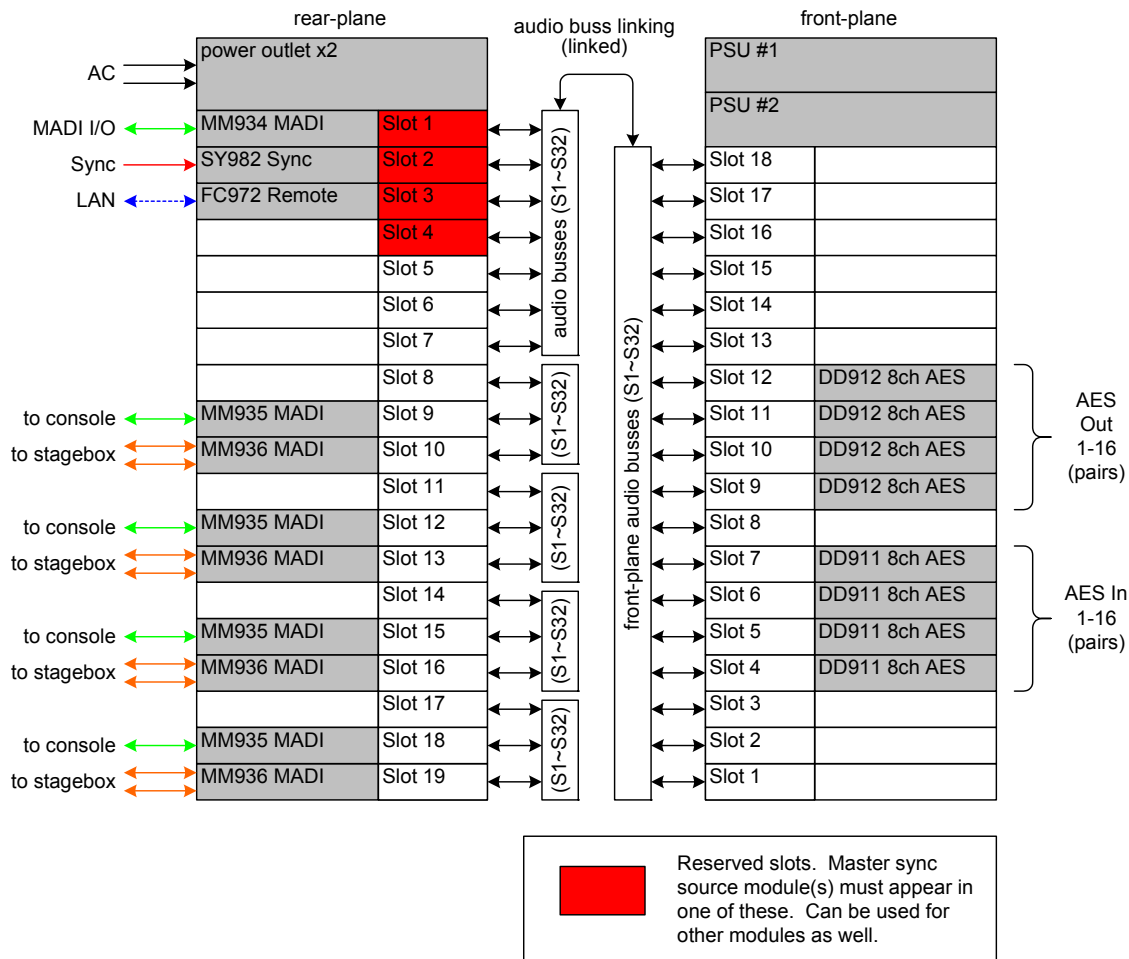


Figure 2-8: Sample Configuration 4

## 2.3 Summary Reference Spreadsheets

The following summary spreadsheets are provided:

- Summary of Frames
- Summary of Sync Modules
- Summary of MADI Module
- Summary of I/O Modules
- Cross-reference Between MM934 MADI I/O and Audio Busses

### 2.3.1 Summary of Module Frames

frame	description	PSU	front-plane slots (4HP) for local I/O	rear-plane slots (4HP) for local I/O	front/rear backplane link switch	audio isolated redundant MADI-over-Fiber interface positions	power
IO93	standard double-sided frame	dual redundant hot-swappable	18	19	yes	---	~12 amps @5vDC
IO94	single-sided frame for stagebox use	dual redundant built-in	---	19	---	---	~20amps @5vDC
IO95	double-sided frame for local-side MADI-over-Fiber interface	dual redundant hot-swappable	18	7	yes	4 typical (up to 6 using local I/O slots)	~12 amps @5vDC
Sync: Each frame locks to a single sync source module fitted in slots 1~4 in the rear-plane.							
Control: Remote operation of modules (when required) via a single FC972 Remote module. May be fitted in any slot.							
All frames weight ~5.3kg							

Figure 2-9: Summary of Frames

### 2.3.2 Summary of Sync Modules

part	description	connector	width (4HP slots)	power (5vDC)	weight
FC972 Frame Controller	remote control module	RJ45 (LAN)	1	~300mA	~200g
SY982 Sync	single sync input	BNC (Sync In, WC Out)	1	~300mA	~200g
SY983 Sync	tri-level sync support	BNC (Sync In, WC Out)	1	~300mA	~200g
WC984 4x Word Clock Out	word clock output x4	BNC x4	1	~100mA	~150g
	= discontinued				

Figure 2-10: Summary of Sync Modules

### 2.3.3 Summary of MADI Modules

part	description	configuration	connector	width (4HP slots)	requires Frame Controller	power (5vDC)	weight
MM934 MADI I/O	coax MADI I/O	on-board working modes**	BNC (In, Out)	1	---	~350mA	~150g
MM934opt MADI I/O	coax/fiber MADI I/O	on-board working modes**	BNC x2, SC x2	1	---	~500mA	~150g
MM935 MADI I/O	redundant fiber I/O	cross-point matrix via web-browser interface	SC x4	1	yes	~350mA	~150g
MM936 MADI I/O	coax MADI I/O	cross-point matrix via web-browser interface	BNC (In, Out)	1	yes	~300mA	~200g
Note: All fiber transceivers 62.5/125µm multimode. 1310 nm wavelength.							
**MM934 Working Modes:							
	64 MADI In						
	56 MADI In						
	48 MADI In / 16 MADI Out						
	32 MADI In / 32 MADI Out						
	16 MADI In / 48 MADI Out						
	56 MADI Out						
	64 MADI Out						
All MADI modules feature "Master" mode enabling a frame to lock to incoming MADI.							

**Figure 2-11: Summary of MADI Modules**



### 2.3.4 Summary of I/O Modules

	part	connectors	width (4HP slots)	requires Frame Controller	power (5vDC)	weight
<b>mic</b>						
	AD914 4Ch Mic In	RJ45 x4	1	yes	~1300mA	~300g
	AD924 4ch Mic In	MXLR x4	2	yes	~1100mA	~300g
<b>analog line</b>						
	AD920 4ch Analog In	FXLR x4	2	---	~850mA	~200g
	DA921 4ch Analog Out	MXLR x4	2	---	~650mA	~200g
	AD922 4ch Analog In	15 pin Dsub x1	1	---	~850mA	~200g
	DA923 4ch Analog Out	15 pin Dsub x1	1	---	~650mA	~200g
<b>digital</b>						
	DD908 4ch AES I/O (110Ω)	MXLR x2, FXLR x2	2	---	~100mA	~200g
	DD909 8ch AES Input (110Ω)	MXLR x4	2	---	~100mA	~200g
	DD910 8ch AES Output (110Ω)	FXLR x4	2	---	~100mA	~200g
	DD911 4ch AES I/O (75Ω)	BNC x4	1	---	~100mA	~150g
	DD912 8ch AES Input (75Ω)	BNC x4	1	---	~100mA	~150g
	DD913 8ch AES Output (75Ω)	BNC x4	1	---	~100mA	~150g
<b>Dolby</b>						
	DE901 Dolby D/E Decoder	BNC, 9 pin Dsub	1	yes	~1000mA	~300g
	DE911 Dolby E Encoder	BNC, 9 pin Dsub	1	yes	~1000mA	~300g
	DE912 Dolby D+ Encoder	BNC, 9 pin Dsub	1	yes	~1000mA	~300g
<b>embedder/de-embedder</b>						
	SD941 4ch SD Embedder/De-embedder	BNC (In, Out, Thru)	1	---	~800mA	~300g
	SD942 8ch SD Embedder/De-embedder	BNC (In, Out, Thru)	1	yes	~1000mA	~300g
	HD943 8ch HD/SD Embedder/De-embedder	BNC (In, Out, Thru)	1	yes	~1000mA	~300g
		= discontinued				

Figure 2-12: Summary of I/O Modules

### 2.3.5 Cross-Reference Between MM934 MADI I/O and Audio Busses

input	Single MM934 MADI I/O configuration working modes:					output
	56 in	48 in, 16 out	32 in, 32 out	16 in, 48 out	56 out	
audio in 1/2	---	S1	S1	S1	S1	MADI out 1/2
audio in 3/4	---	S2	S2	S2	S2	MADI out 3/4
audio in 5/6	---	S3	S3	S3	S3	MADI out 5/6
audio in 7/8	---	S4	S4	S4	S4	MADI out 7/8
audio in 9/10	---	S5	S5	S5	S5	MADI out 9/10
audio in 11/12	---	S6	S6	S6	S6	MADI out 11/12
audio in 13/14	---	S7	S7	S7	S7	MADI out 13/14
audio in 15/16	---	S8	S8	S8	S8	MADI out 15/16
audio in 17/18	---	---	S9	S9	S9	MADI out 17/18
audio in 19/20	---	---	S10	S10	S10	MADI out 19/20
audio in 21/22	---	---	S11	S11	S11	MADI out 21/22
audio in 23/24	---	---	S12	S12	S12	MADI out 23/24
audio in 25/26	---	---	S13	S13	S13	MADI out 25/26
audio in 27/28	---	---	S14	S14	S14	MADI out 27/28
audio in 29/30	---	---	S15	S15	S15	MADI out 29/30
audio in 31/32	---	---	S16	S16	S16	MADI out 31/32
audio in 33/34	---	---	---	S17	S17	MADI out 33/34
audio in 35/36	---	---	---	S18	S18	MADI out 35/36
audio in 37/38	---	---	---	S19	S19	MADI out 37/38
audio in 39/40	---	---	---	S20	S20	MADI out 39/40
audio in 41/42	---	---	---	S21	S21	MADI out 41/42
audio in 43/44	---	---	---	S22	S22	MADI out 43/44
audio in 45/46	---	---	---	S23	S23	MADI out 45/46
audio in 47/48	---	---	---	S24	S24	MADI out 47/48
audio in 49/50	---	---	---	---	S25	MADI out 49/50
audio in 51/52	---	---	---	---	S26	MADI out 51/52
audio in 53/54	---	---	---	---	S27	MADI out 53/54
audio in 55/56	---	---	---	---	S28	MADI out 55/56
MADI in 1/2	S32	S32	S32	S32	---	audio out 1/2
MADI in 3/4	S31	S31	S31	S31	---	audio out 3/4
MADI in 5/6	S30	S30	S30	S30	---	audio out 5/6
MADI in 7/8	S29	S29	S29	S29	---	audio out 7/8
MADI in 9/10	S28	S28	S28	S28	---	audio out 9/10
MADI in 11/12	S27	S27	S27	S27	---	audio out 11/12
MADI in 13/14	S26	S26	S26	S26	---	audio out 13/14
MADI in 15/16	S25	S25	S25	S25	---	audio out 15/16
MADI in 17/18	S24	S24	S24	---	---	audio out 17/18
MADI in 19/20	S23	S23	S23	---	---	audio out 19/20
MADI in 21/22	S22	S22	S22	---	---	audio out 21/22
MADI in 23/24	S21	S21	S21	---	---	audio out 23/24
MADI in 25/26	S20	S20	S20	---	---	audio out 25/26
MADI in 27/28	S19	S19	S19	---	---	audio out 27/28
MADI in 29/30	S18	S18	S18	---	---	audio out 29/30
MADI in 31/32	S17	S17	S17	---	---	audio out 31/32
MADI in 33/34	S16	S16	---	---	---	audio out 33/34
MADI in 35/36	S15	S15	---	---	---	audio out 35/36
MADI in 37/38	S14	S14	---	---	---	audio out 37/38
MADI in 39/40	S13	S13	---	---	---	audio out 39/40
MADI in 41/42	S12	S12	---	---	---	audio out 41/42
MADI in 43/44	S11	S11	---	---	---	audio out 43/44
MADI in 45/46	S10	S10	---	---	---	audio out 45/46
MADI in 47/48	S9	S9	---	---	---	audio out 47/48
MADI in 49/50	S8	---	---	---	---	audio out 49/50
MADI in 51/52	S7	---	---	---	---	audio out 51/52
MADI in 53/54	S6	---	---	---	---	audio out 53/54
MADI in 55/56	S5	---	---	---	---	audio out 55/56

Figure 2-13: Cross-Reference Between MM934 MADI I/O and Audio Busses

---

## Chapter 3: Product Data Sheets

---

In this chapter, the following Product Data Sheets are provided:

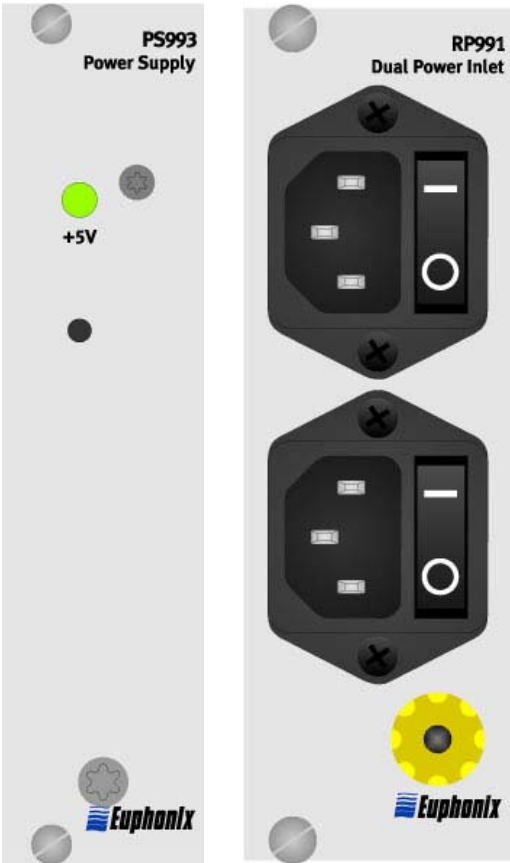
- IO93 Modular I/O Frame
- IO94 Modular I/O Stagebox Frame
- IO95 Modular I/O Frame (for local-side redundant MADI-over-fiber interface)
- MM934/MM934opt MADI In/Out
- MM935 MADI In/Out
- MM936 MADI In/Out
- SY982 Sync (discontinued)
- SY983 Sync
- FC972 Remote
- WC984 4ch WCLK Out
- AD914 4ch Microphone Input
- AD920 4ch Analog Line Input
- DA921 4ch Analog Line Output
- AD922 4ch Analog Line Input
- DA923 4ch Analog Line Output
- AD924 4ch Microphone Input
- DD908 4ch AES I/O (110Ω)
- DD909 8ch AES Input (110Ω)
- DD910 8ch AES Output (110Ω)
- DD911 4ch AES I/O (75Ω)
- DD912 8ch AES Input (75Ω)
- DD913 8ch AES Output (75Ω)
- DE901 Dolby D/E Decoder
- DE911 Dolby E Encoder
- DE912 Dolby D+ Encoder
- SD941 4ch SD Embedder/De-embedder (discontinued)
- SD942 8ch SD Embedder/De-embedder
- HD943 8ch HD/SD Embedder/De-embedder

**IO93 Modular Frame**

1/3

**Features**

- 19" modular chassis, 3RU, RF shielded
- incl. 2 power supplies PS993 in redundant mode
- incl. 1 double appliance socket with mains filter and switch
- dual plane-card installation from both sides
- external dimensions in accordance with DIN 41494, 320mm depth
- aluminum side panels chromated, aluminum cross extrusions, RF protection by 0.8mm steel covers, zinc passivated



**Frame Layout**



## IO93 Modular Frame

2/3

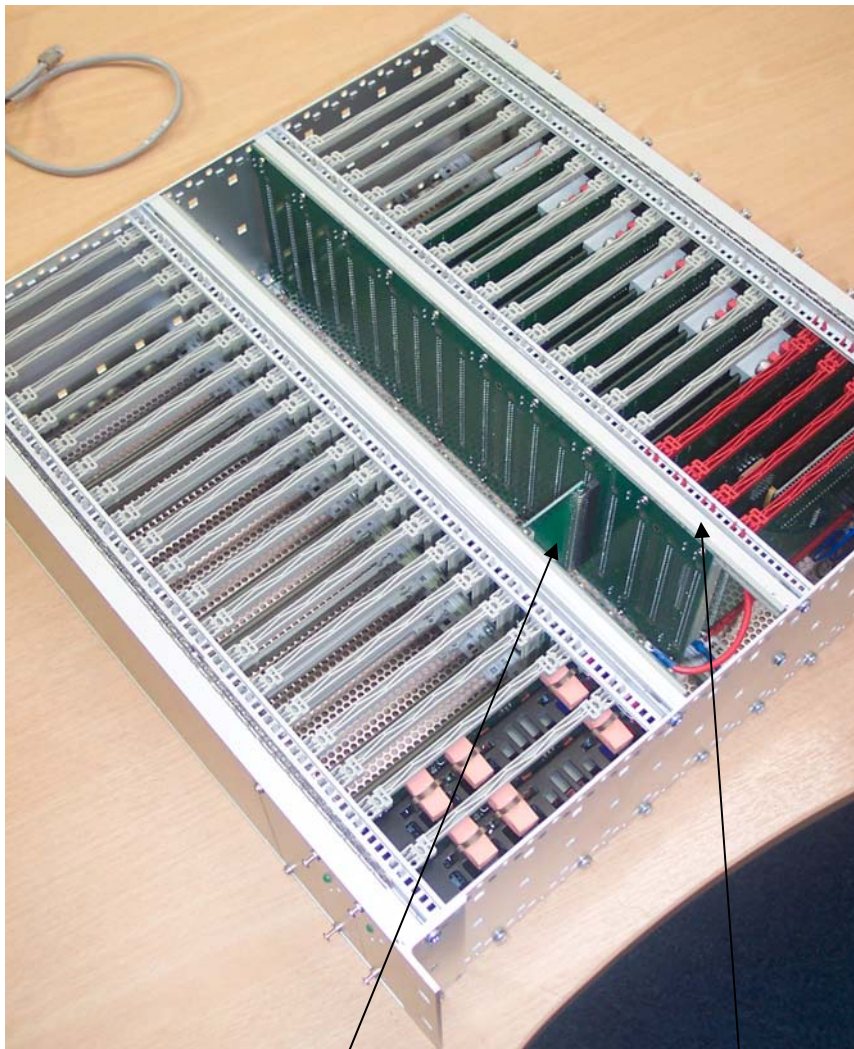
### Technical Specifications

frame size	
depth:	420mm
rack space	3RU
front-plane space for modules:	72HP (18 single-width slots)
rear-plane space for modules:	76HP (19 single-width slots)
weight:	~5.3kg
power supplies:	dual redundant PS993
input:	100~240VAC 50/60Hz auto-sensing
output:	16 amps at 5vDC
connector:	IEC x2
audio busses	
front-plane	32 stereo busses
rear-plane:	32 stereo busses
linking:	via backplane interconnect PC board DIP switches
sync/control busses	
sync slots:	four master sync source reserved slots (4HP each) on rear-plane (may also be used for other modules)
sync linking:	front-plane and rear-plane sync busses linked
control buss:	CAN buss, linked between planes

# IO93 Modular Frame

3/3

## Installation



Audio buss linking interconnect  
PCB w/32 DIP switches (some  
disassembly required to access)

Four red “reserved” slots for master sync  
source modules (may be used for other  
modules as well)

# IO94 Stagebox Frame

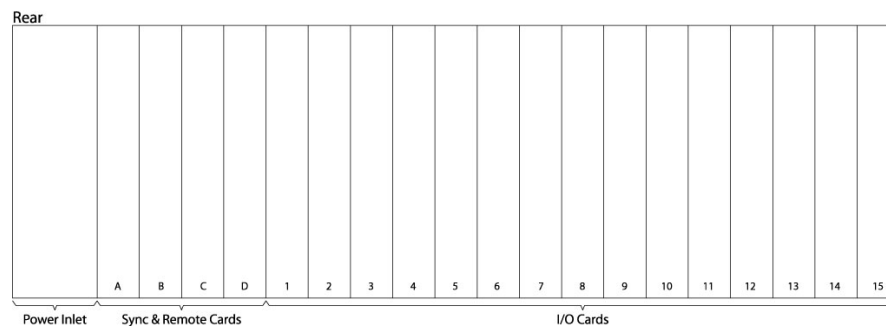
1/3

## Features

- 19" modular chassis, 3RU, RF shielded
- incl. 2 built-in, power supplies in redundant mode
- incl. 1 double appliance socket with mains filter and switch
- single plane-card installation from both sides
- external dimensions in accordance with DIN 41494, 320mm depth
- aluminum side panels chromated, aluminum cross extrusions, RF protection by 0.8mm steel covers, zinc passivated
- Designed specifically for stagebox application. Configurations with 48 remote preamps/16 analog outs available.



## Frame Layout



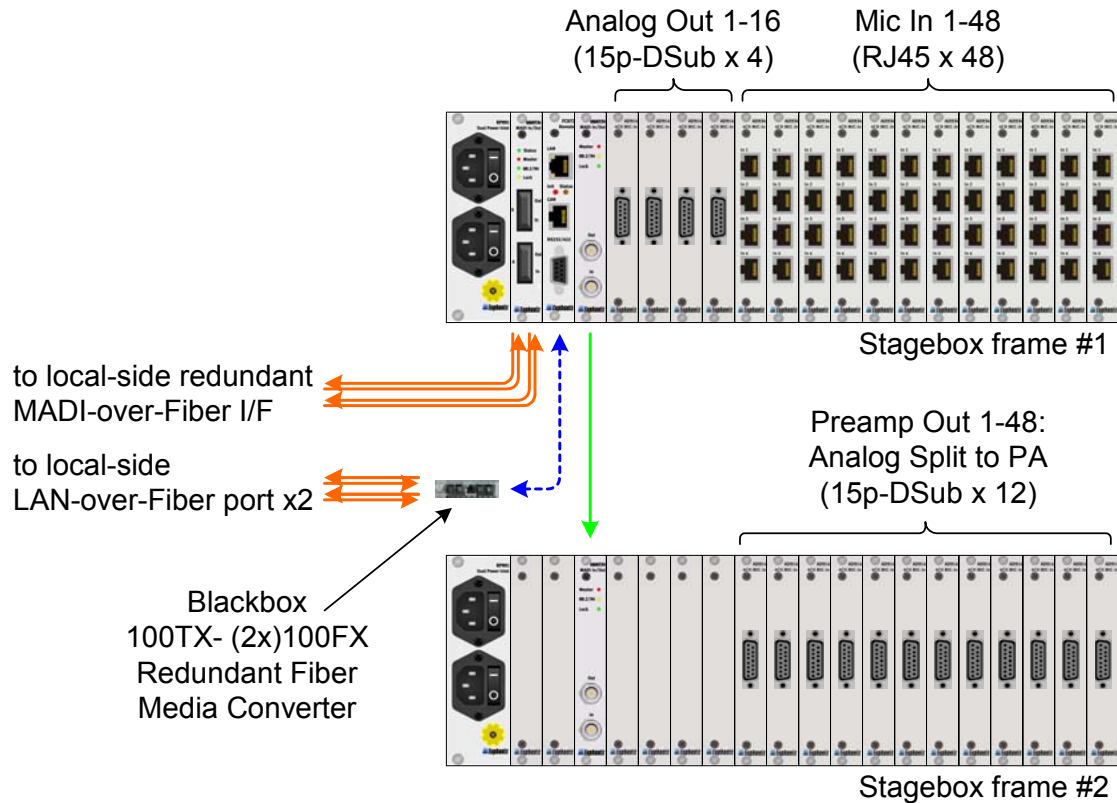
# IO94 Stagebox Frame

2/3

## Technical Specifications

frame size	
depth:	300mm
rack space	3RU
rear-plane space for modules:	76HP (19 single-width slots)
weight:	~5.3kg
power supplies:	dual redundant built-in supplies
input:	100~240VAC 50/60Hz auto-sensing
output:	20 amps at 5vDC
connector:	IEC x2
audio busses	32 stereo busses
sync/control busses	
sync slots:	four master sync source reserved slots (4HP each) on rear-plane (may also be used for other modules)
control buss:	CAN buss

## Sample Configuration





# IO94 Stagebox Frame

3/3

## Installation



front-view



rear-view

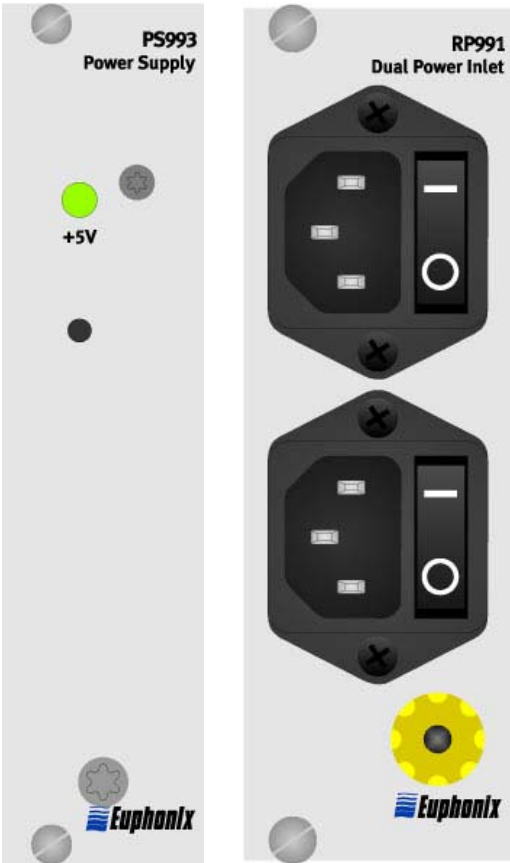
Four red “reserved” slots  
for master sync source  
modules (may be used for  
other modules as well)

# IO95 Modular Frame

1/4

Features

- 19" modular chassis, 3RU, RF shielded
- incl. 2 power supplies PS993 in redundant mode
  - incl. 1 double appliance socket with mains filter and switch
  - dual plane-card installation from both sides
  - external dimensions in accordance with DIN 41494, 320mm depth
  - aluminum side panels chromated, aluminum cross extrusions, RF protection by 0.8mm steel covers, zinc passivated
  - Provides four positions for local-side redundant MADl-over-Fiber interface



Frame Layout



## IO95 Modular Frame

2/4

### Technical Specifications

frame size	
depth:	420mm
rack space	3RU
front-plane space for modules:	72HP (18 single-width slots)
rear-plane space for modules:	76HP (19 single-width slots. 12 of these slots are audio isolated to provide four positions for local-side redundant MADI-over-Fiber interface)
weight:	~5.3kg
power supplies:	dual redundant PS993
input:	100~240VAC 50/60Hz auto-sensing
output:	16 amps at 5vDC
connector:	IEC x2
audio busses	
front-plane	32 stereo busses
rear-plane:	32 stereo busses
linking:	via backplane interconnect PC board DIP switches
sync/control busses	
sync slots:	four master sync source reserved slots (4HP each) on rear-plane (may also be used for other modules)
sync linking:	front-plane and rear-plane sync busses linked
control buss:	CAN buss, linked between planes

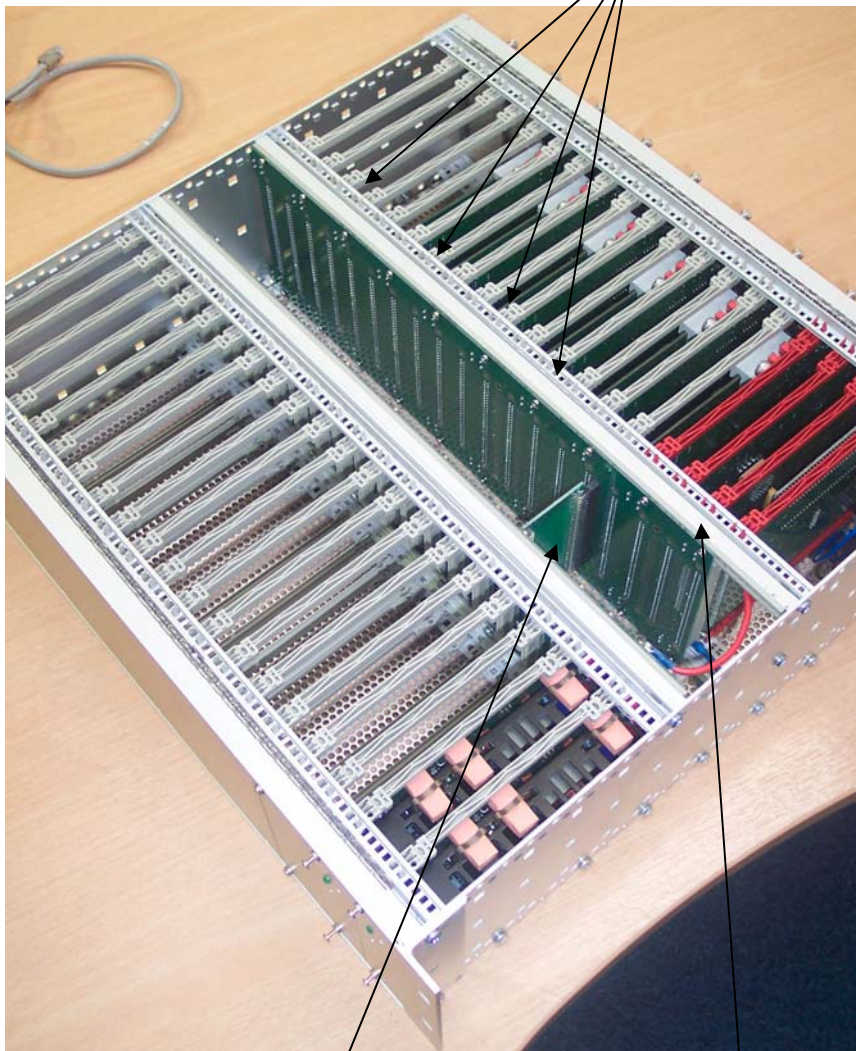
## IO95 Modular Frame

3/4

### Installation



Audio buss separations allow four audio-isolated “positions” for local-side redundant MADl-over-Fiber interface



Audio buss linking interconnect PCB w/32 DIP switches (some disassembly required to access)

Four red “reserved” slots for master sync source modules (may be used for other modules as well)

# IO95 Modular I/O Frame

4/4

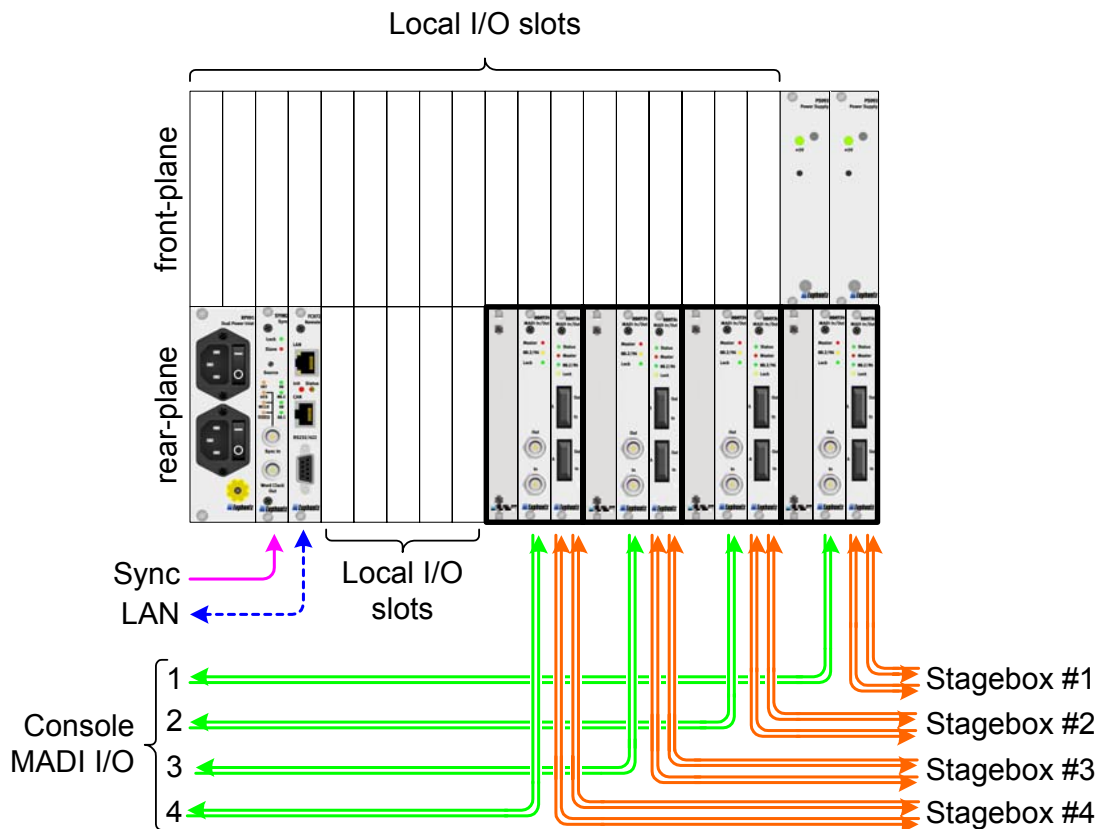
## Local-side Redundant MADI-over-Fiber Interface

The IO95 frame provides four “positions” for local-side interface to redundant MADI-over-Fiber stageboxes. Audio busses in these positions are isolated from the rest of the frame. Sync and control busses are shared. Each position is fitted with an MM936 MADI I/O (redundant fiber) for connection to the stagebox and an MM934 MADI I/O (coax) for connection to the console.

An FC972 Remote is required to configure the MM936 modules. An SY983 is fitted to accept external sync. Stageboxes set to “sync-to-MADI” are therefore not reliant upon console MADI output for sync.

All other slots can be used for Local I/O.

## Sample Configuration



# MM934/MM934opt MADI In/Out

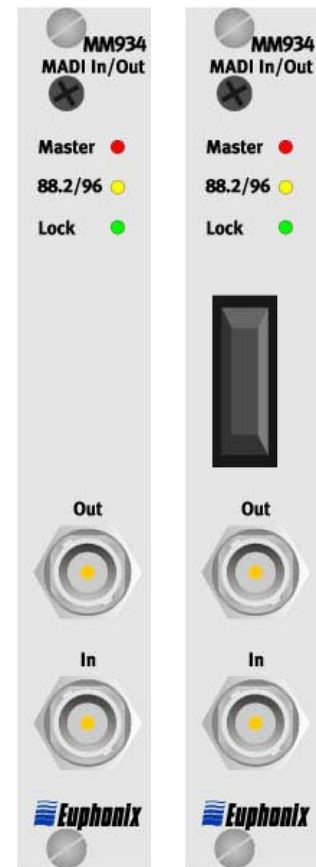
1/4

## Features

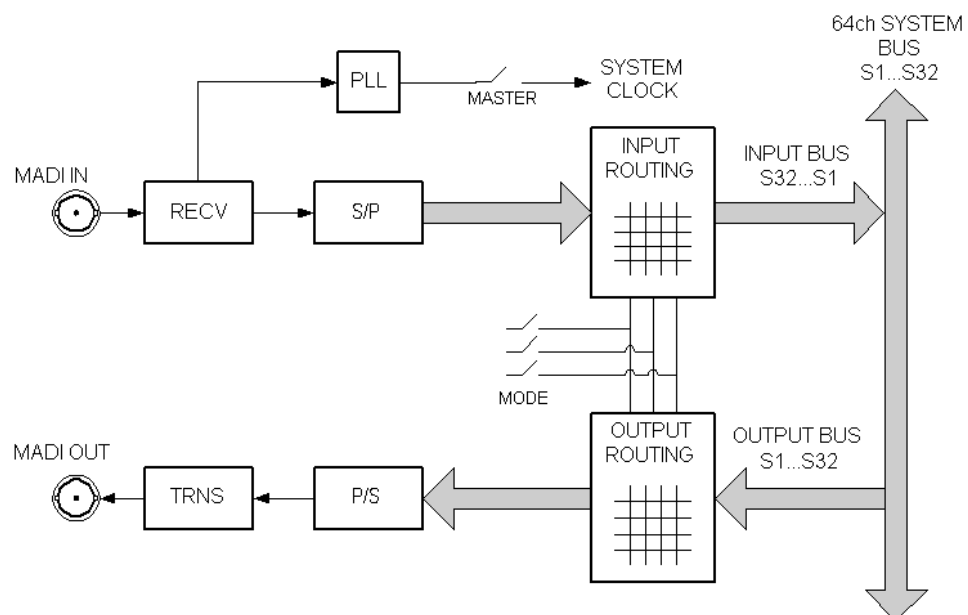
- interface for MADI coded multi-channel audio signals
- MADI receiver and transmitter
- extended mode (max 64ch) and high sampling mode (max 32ch at 96kHz)
- word length 24 bit
- MASTER mode: rack locks to MADI input with no need for an SY982 Sync module

### MM934opt:

- multimode fibre transceiver
- input auto-sensing: detects whether signal is present on coaxial or fibre input
- parallel output: coaxial and fibre outputs are both active



## Block Diagram



# MM934/MM934opt MADI In/Out

2/4

## Technical Specifications

MADI interface:

Standard:

AES10 (1995)

Connector:

BNC, 75 Ohm, coaxial (MADI in, MADI out),  
 SC x2 (SC Duplex), 62.5/125µm multimode (MM934opt), 1310nm  
 wavelength. One fiber strand per MADI direction

signal level:

800mV ±10%

audio data format:

24bit, 48kHz = max 64ch

24bit, 96kHz = max 32 ch

backplane connector:

ref. to DIN41612, 64pin, a+b, male

power supply:

+5V DC

consumption:

appr. 350 mA (MM934)

appr. 500mA (MM934opt)

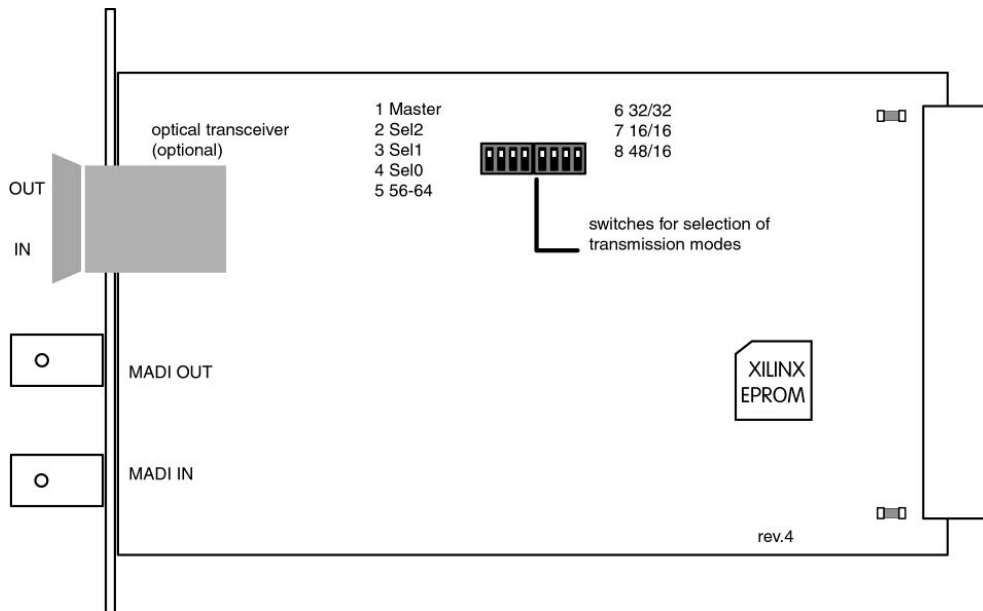
dimensions:

3RU, 4HP, 175mm depth

weight:

~150g

## Installation



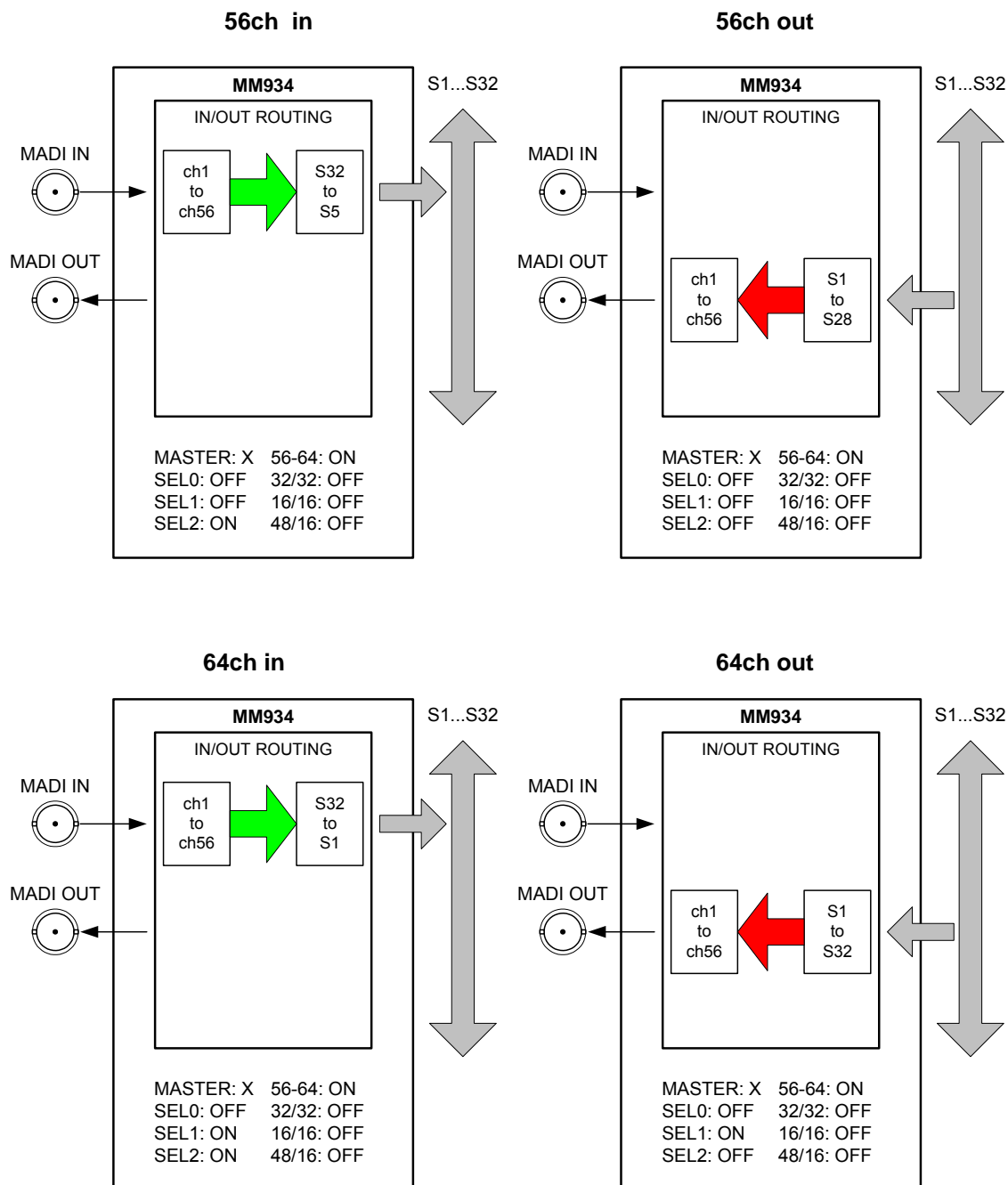
Switch	Name	Description	Bus status
<b>S1</b>	MASTER	system clock derived from MADI input	system clock locked to MADI
<b>S2</b>	SEL2	Function selection #3	See mode description
<b>S3</b>	SEL1	Function selection#2	See mode description
<b>S4</b>	SEL0	Function selection #1	See mode description
<b>S5</b>	56-64	56/64ch input or output mode selection	See mode description
<b>S6</b>	32/32	32ch input and output mode selection	See mode description
<b>S7</b>	16/16	16ch input and output mode selection	See mode description
<b>S8</b>	48/16	48/16ch or 16/48ch I/O mode selection	See mode description



# MM934/MM934opt MADI In/Out

3/4

## Working Modes on Standard Sampling Rates (44.1/48kHz)

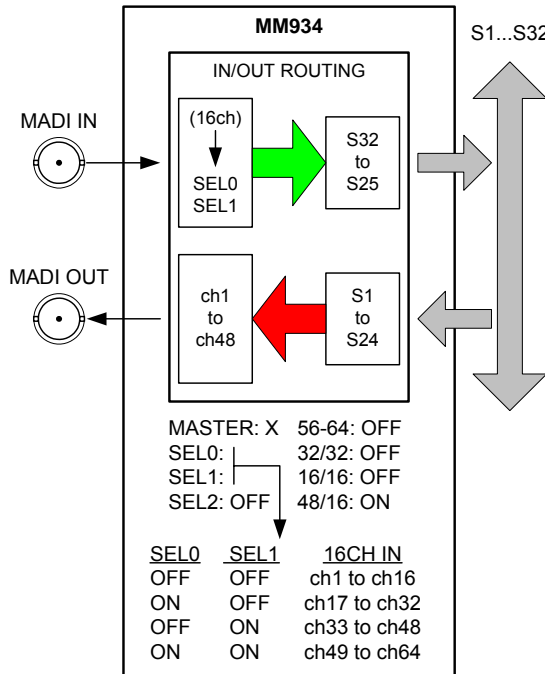




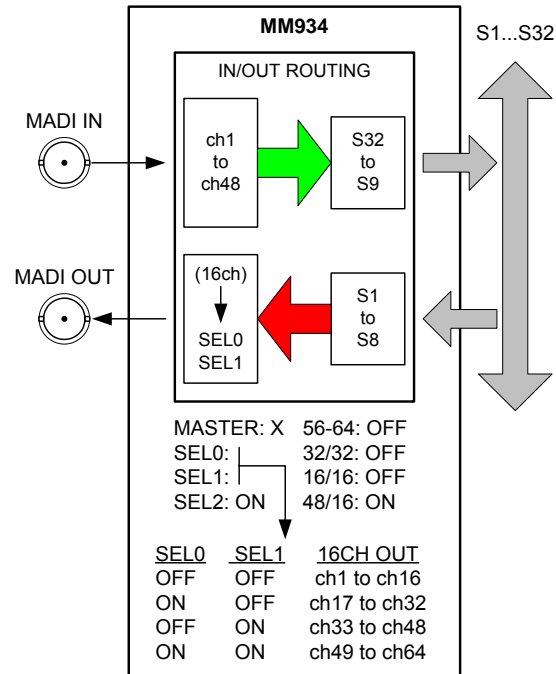
# MM934/MM934opt MADI In/Out

4/4

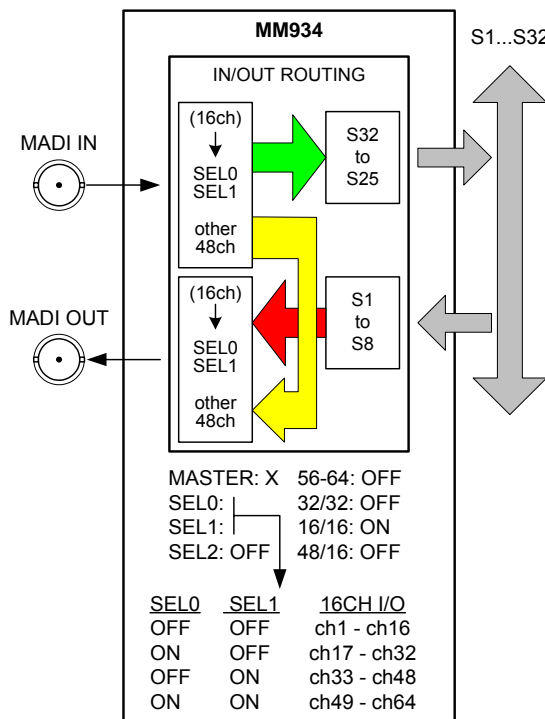
16ch in / 48ch out



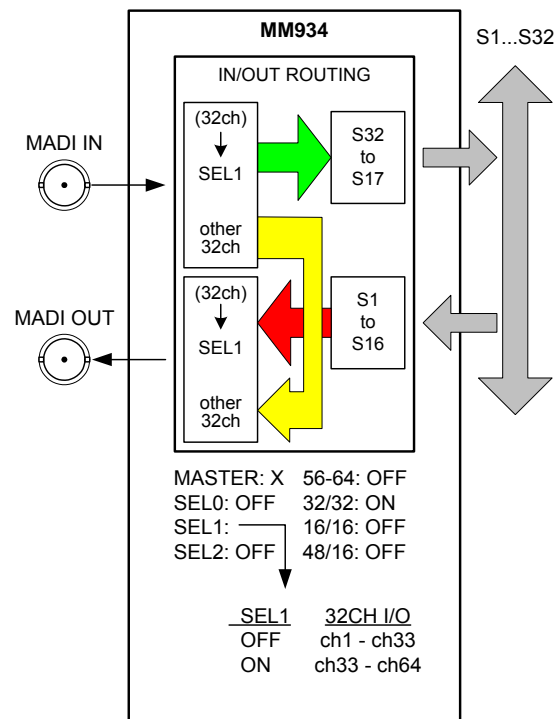
48ch in / 16ch out



16ch in / 16ch out



32ch in / 32ch out



## MM935 MADI In/Out

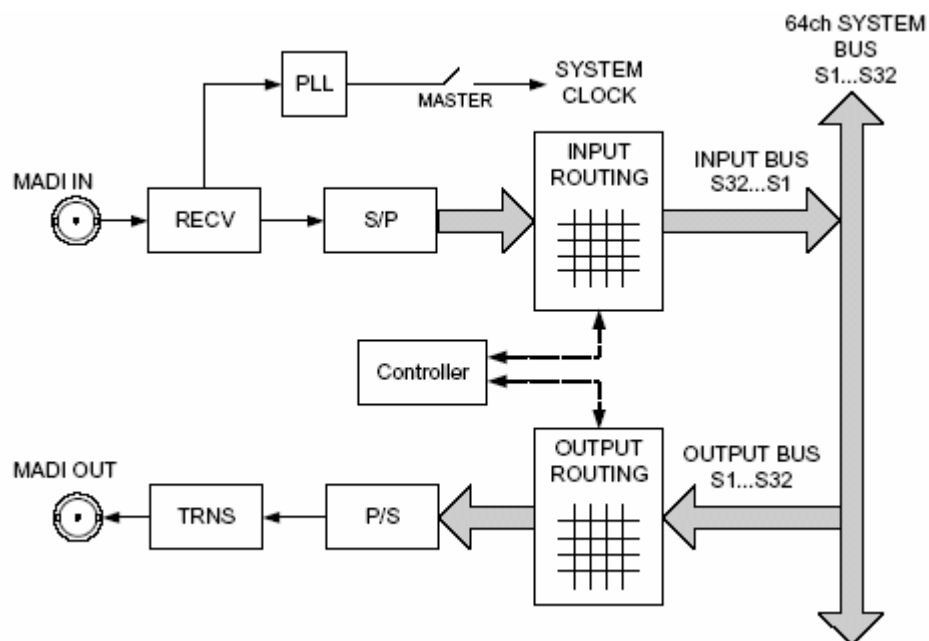
1/3

### Features

- interface for MADI coded multichannel audio signals
- MADI receiver and transmitter
- BNC 75 ohm
- extended mode (max. 64ch's) and high sampling mode (max. 32ch's at 96kHz)
- word length 24 bit
- MASTER mode: rack locks to MADI input with no need for an SY983 Sync module
- full crosspoint matrix configuration/setup by web browser interface



### Block Diagram



MM935 MADI In/Out

2/3

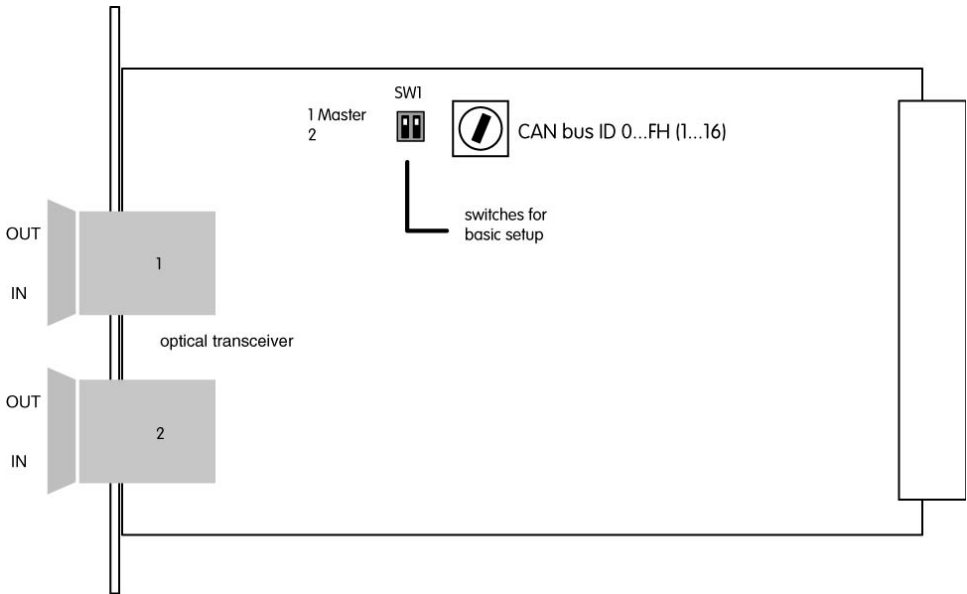
Technical Specifications

MADI interface  
standard: AES 10 (2003)  
connection: BNC, 75 ohm  
signal level: 800mV +/-10%  
audio data format: 24bit transparent for C- and U-Bit according to AES3  
audio sample rate: 24bit, 48kHz = max. 64 channels  
24bit, 96kHz = max. 32 channels

backplane connector: ref. to DIN41612, 64pin, a+b, male  
power supply +5V DC

consumption: appr. 360 mA  
dimensions: 3RU, 4HP, 175mm depth  
weight: ~300g  
ambient: 10°C to 40°C  
humidity: 90%, non condensing

Installation



Local Setup  
**CAN – ID:** Rotary switch to set the module ID (0...F)  
**SW1:**

Switch No	Name	Description	Frame bus status
S1	MASTER	Frame system clock derived from MADI Input. Fit module into one of the four reserved slots on the rear-plane.	system clock locked to MADI
S2		Not used	

## MM935 MADI In/Out

# 3/3

Remote configuration via web interface:

Setting of all configurations, parameters and functions via web browser

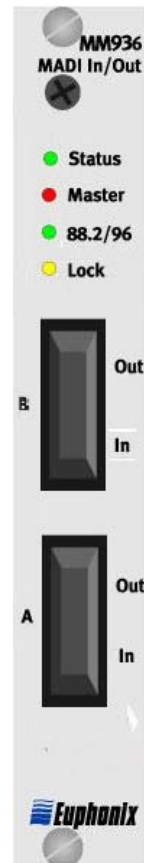
<b>DEVICE:</b>	Setting of "Device Name"	
	Functions:	Restart device, Initialize device Backup, Restore (all settings to / from file) displays firmware version
<b>SETUP:</b>	CHANNEL-MODE:	set to 56 or 64 audio channel
	MADI-BYPASS:	direct loop through the module without using the frame busses
<b>DECODER:</b>	Routing of received MADI-channels to frame buss:	
	2 CHANNEL MODE: MADI channels are routed in pairs (1/2...63/64) per buss	
	8 CHANNEL MODE: 8 consecutive channels are routed in TDM per buss	
<b>ENCODER:</b>	Routing of transmitted MADI-channels from frame buss	
	2 CHANNEL MODE: MADI channels are routed in pairs (1/2...63/64) per buss	
	8 CHANNEL MODE: 8 consecutive channels are routed in TDM per buss	
<b>PRESET:</b>	-Each Preset includes the routing configuration of all active MADI-channels to and from the frame busses.	
	-Presets can be changed manually (web browser) or GPI controlled	
	-Functions: Load, Save preset (8 user presets), Backup, Restore (all presets to / from file)	

# MM936 MADI In/Out

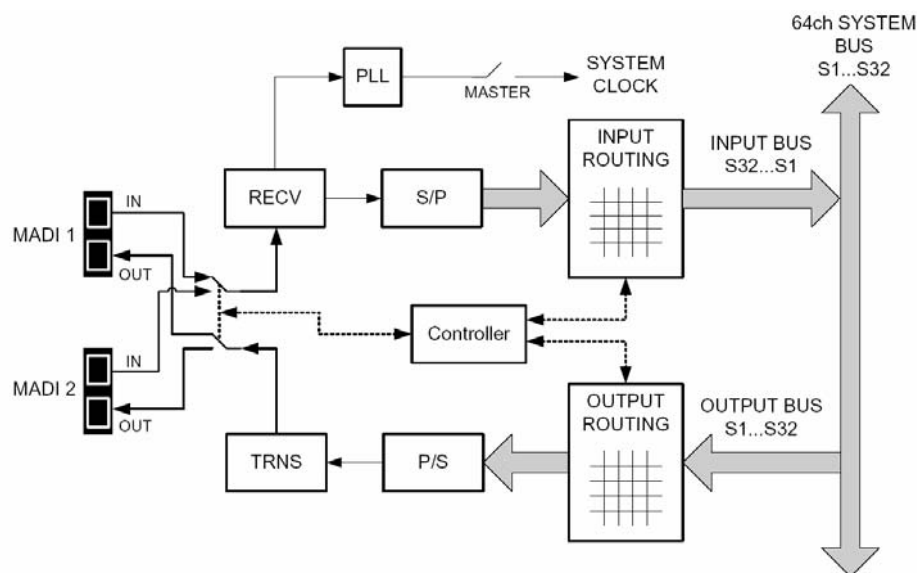
1/3

## Features

- interface for MADI coded multichannel audio signals
- MADI receiver and transmitter
- redundant optical input /output connector (1 > 2)
- extended mode (max. 64ch's) and high sampling mode (max. 32ch's at 96kHz)
- word length 24 bit
- MASTER mode: rack locks to MADI input with no need for an SY982 Sync module
- full crosspoint matrix configuration/setup by web browser interface



## Block Diagram



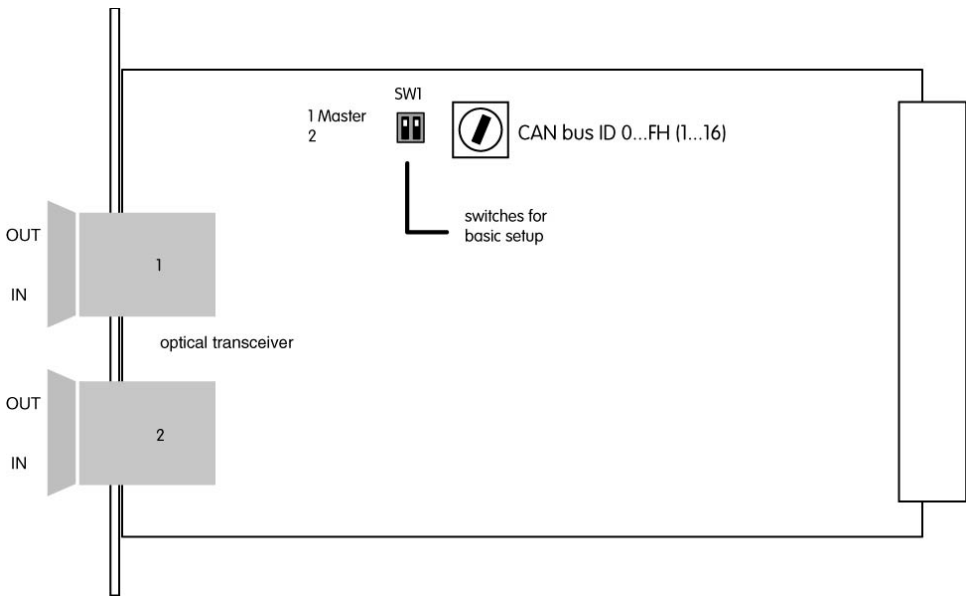
MM936 MADI In/Out

2/3

Technical Specifications

MADI interface  
standard: AES 10 (2003)  
connection: SC duplex x2 / 62.5/125µm multimode fiber.  
signal: 1310nm  
audio data format: 24bit  
transparent for C- and U-Bit according to AES3  
audio sample rate: 24bit, 48kHz = max. 64 channels  
24bit, 96kHz = max. 32 channels  
  
backplane connector: ref. to DIN41612, 64pin, a+b, male  
power supply +5V DC  
consumption: appr. 360 mA  
dimensions: 3RU, 4HP, 175mm depth  
weight: ~300g  
ambient: 10°C to 40°C  
humidity: 90%, non condensing

Installation



Local Setup  
**CAN – ID:** Rotary switch to set the module ID (0...F)  
**SW1:**

Switch No	Name	Description	Frame bus status
S1	MASTER	Frame system clock derived from MADI Input. Fit module into one of the four reserved slots on the rear-plane.	system clock locked to MADI
S2		Not used	

## MM936 MADI In/Out

# 3/3

Remote configuration via web interface:

Setting of all configurations, parameters and functions via web browser

<b>DEVICE:</b>	Setting of "Device Name"	
	Functions:	Restart device, Initialize device Backup, Restore (all settings to / from file) displays firmware version
<b>SETUP:</b>	CHANNEL-MODE:	set to 56 or 64 audio channel
	MADI-BYPASS:	direct loop through the module without using the frame busses
	INPUT SELECT:	select IN 1, IN 2 or AUTO <b>AUTO means automatically switch over from IN 1 to IN 2 in case of IN 1 is lost</b>
	ERROR-FLAG :	---
<b>DECODER:</b>	Routing of received MADI-channels to frame buss:	
	2 CHANNEL MODE: MADI channels are routed in pairs (1/2...63/64) per buss	
	8 CHANNEL MODE: 8 consecutive channels are routed in TDM per buss	
<b>ENCODER:</b>	Routing of transmitted MADI-channels from frame buss	
	2 CHANNEL MODE: MADI channels are routed in pairs (1/2...63/64) per buss	
	8 CHANNEL MODE: 8 consecutive channels are routed in TDM per buss	
<b>PRESET:</b>	-Each Preset includes the routing configuration of all active MADI-channels to and from the frame busses. -Presets can be changed manually (web browser) or GPI controlled -Functions: Load, Save preset (8 user presets), Backup, Restore (all presets to / from file)	
<b>GPI/TALLY : TBD</b>		

# SY982 Sync

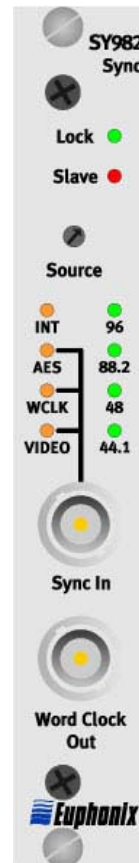
1/3

## Features

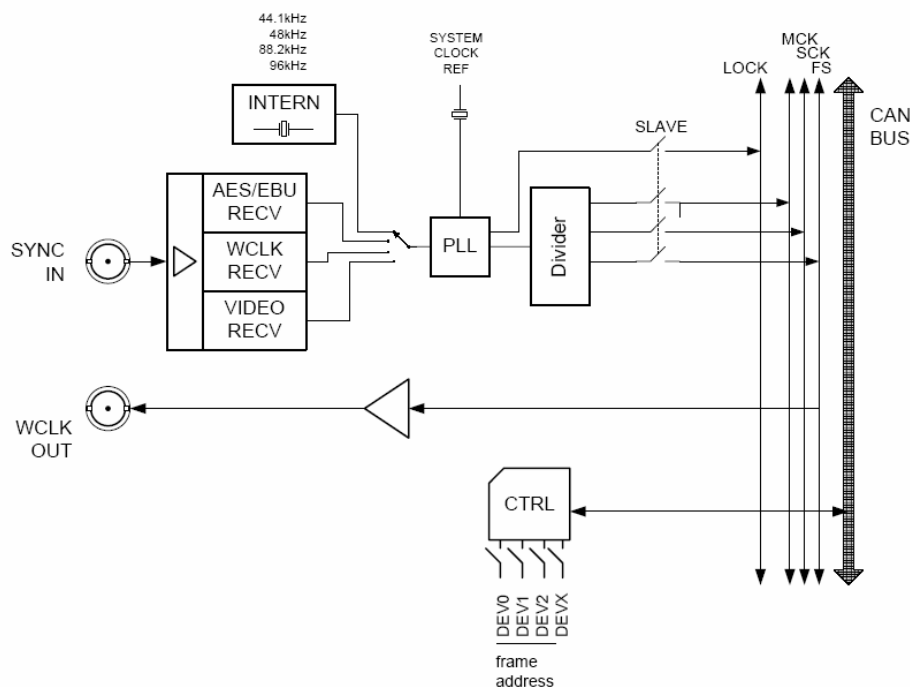
- provides sync for modular I/O frames
- internal sync at 44.1, 48, 88.2 or 96kHz
- external sync by AES, word clock or video signal
- lock indication
- redundant sync source with a second SY982
- frame address setting
- word clock output

## operation

- turn the front-panel source switch with a small screwdriver to step through all available sync modes: int 44.1, int 48, int 88.2, int 96, ext video, wclk, aes



## Block Diagram





# SY982 Sync

2/3

## Technical Specifications

### sync interface

internal sync: switchable 44.1, 48, 88.2 or 96kHz,

### external sync:

VIDEO connector: BNC, 75 Ohm, coaxial

Level: 0,5 ... 1 Vpp

input format: Blackburst or PAL/NTSC composite video

WCLK connector: BNC, 75 Ohm, coaxial

level: TTL-level

input format: Wordclock

AES connector: BNC, 75 Ohm, coaxial

Level: 0,5 ... 5 Vpp

input format: AES professional, AES consumer

### general

backplane connector: ref. to DIN41612, 64pin, a+b, male

power supply: +5V DC

consumption: approx. 300 mA

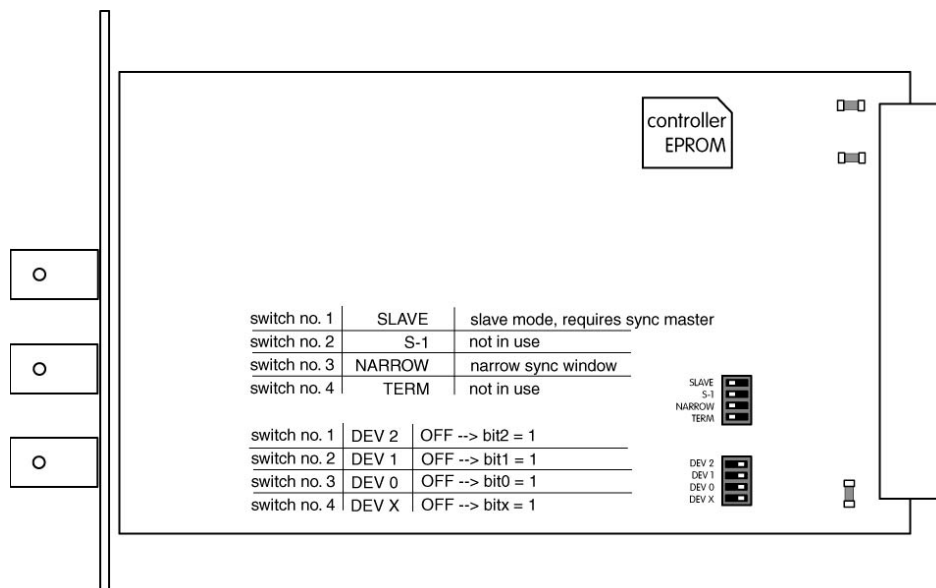
dimensions: 3RU, 4HP, 175mm depth

weight: ~200g

## Installation

### Module exchange

When swapping out the SY982, the frame must be powered off if there is no redundant sync module fitted. Without stable clock some interface modules can fall into irregular condition which can damage parts of the circuits.



## SY982 Sync

3/3

### Redundant clock sources

The SY982 Sync module is the central clocking source for the Modular I/O system. It provides all necessary clocks for proper system operation and can be synchronized internally or externally. A Modular I/O frame can be equipped with a second (redundant) SY982. Both sync modules must be installed in the red “reserved” slots on the rear-plane of the frame.

Use the MASTER/SLAVE DIP to set the first SY982 as MASTER and the second unit to SLAVE. Both SY982 modules should be locked to the same external sync source. In this mode, both modules generate all clocks all the time with the SLAVE disconnected from the frame sync busses. A red LED “SLAVE” normally lights indicating the SLAVE module is in “ready” status.

The SLAVE unit permanently watches the correct LOCK status of the MASTER. In case of failure of the MASTER (losing external sync or fault on the module hardware) the SLAVE unit takes over and continues clocking the frame. The red SLAVE-LED blinks in this condition. If the MASTER unit returns to lock (new sync signal, or new hardware) it automatically takes over the clock busses and the SLAVE returns to the “ready” status.

### Setting the frame ID

Set DEV0, DEV1, & DEV2 to “ON.”

### DEV X

On the master sync module, set DEVX to “ON.” On a redundant sync module, set to “OFF.”

### Can Buss Termination

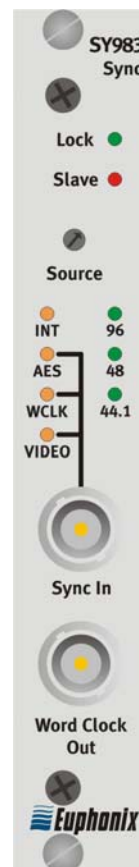
Can Buss Termination must be done on either the SY982 Sync or FC972 Remote. Lack of termination or double termination may result in communication errors in the system. Typically, CAN Termination is done on the FC972.

# SY983 Sync

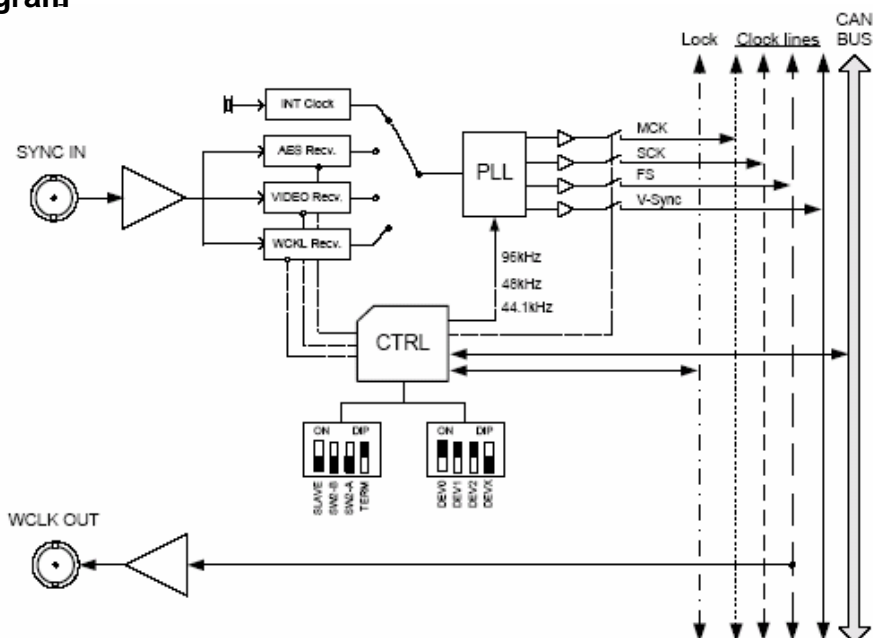
1/3

## Features

- provides sync for modular I/O frames
- internal sync at 44.1, 48, 88.2 or 96kHz
- external sync by AES, word clock or video reference
- video references:
  - Blackburst (NTSC or PAL)
  - Composite Sync (525 or 625)
  - Tri-Level Sync (HD-720p, 1080i, 1080p)
- lock indication
- slave indication
- redundant sync source with a second SY983
- word clock output
- front-panel rotary source encoder
- all functions setup via web-browser interface



## Block Diagram



# SY983 Sync

2/3

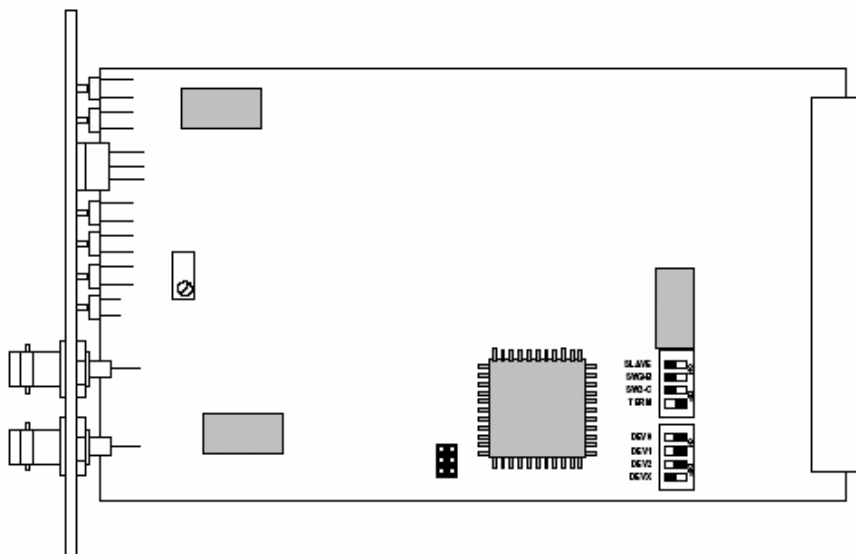
## Technical Specifications

sync interface	
internal sync:	switchable 44.1, 48, 96kHz,
external sync:	
VIDEO connector:	BNC, 75 Ohm, coaxial
level:	0,5 ... 1 Vpp (BB/CS) +/-0,3V (Tri-Level)
input format:	PAL / NTSC / HDTV
rates:	1080i/50/59.94/60 720p/50/59.94/60 1080p/23.98/24/25/29.97/30/50/59.94/60
WCLK connector:	BNC, 75 Ohm, coaxial
level:	TTL-level
AES connector:	BNC, 75 Ohm, coaxial
Level:	0,5 ... 5 Vpp
general	
backplane connector:	ref. to DIN41612, 64pin, a+b, male
power supply:	+5V DC
consumption:	approx. 300 mA
dimensions:	3RU, 4HP, 175mm depth
weight:	~200g

## Installation

### Module exchange

When swapping out the SY982, the frame must be powered off if there is no redundant sync module fitted. Without stable clock some interface modules can fall into irregular condition which can damage parts of the circuits



## SY983 Sync

3/3

### Frame position

The SY983 must be installed in one of the red colored fitting rails at the rear of the frame, close to the mains connectors. In the case of Master / Slave operation, both SY983 modules must be placed here.

### Redundant clock sources

The SY983 Sync module is the central clocking source for the Modular I/O system. It provides all necessary clocks for proper system operation and can be synchronized internally or externally. A Modular I/O frame can be equipped with a second (redundant) SY983. Both sync modules must be installed in the red “reserved” slots on the rear-plane of the frame.

Use the MASTER/SLAVE DIP to set the first SY983 as MASTER and the second unit to SLAVE. Both SY983 modules should be locked to the same external sync source. In this mode, both modules generate all clocks all the time with the SLAVE disconnected from the frame sync busses. A red LED “SLAVE” normally lights indicating the SLAVE module is in “ready” status.

The SLAVE unit permanently watches the correct LOCK status of the MASTER. In case of failure of the MASTER (losing external sync or fault on the module hardware) the SLAVE unit takes over and continues clocking the frame. The red SLAVE-LED blinks in this condition. If the MASTER unit returns to lock (new sync signal, or new hardware) it automatically takes over the clock busses and the SLAVE returns to the “ready” status.

### Setting the frame ID

Set DEV0, DEV1, & DEV2 to “ON.”

### DEV X

On the master sync module, set DEVX to “ON.” On a redundant sync module, set to “OFF.”

### Can Buss Termination

Can Buss Termination must be done on either the SY983 Sync or FC972 Remote. Lack of termination or double termination may result in communication errors in the system. Typically, CAN Termination is done on the FC972.

### Operation

Select a clock source by turning the front-pane; source rotary encoder with a small screw driver. A LED display shows the respective combination of clock frequency and sync mode.

The web interface shows the status of each sync module and provides access to all configuration settings. In case of a severe sync problem, the Frame Controller can send a SNMP trap and or activate a GPO. A higher-ranking monitoring system may poll the status of the sync module(s) via SNMP

# FC972 Remote

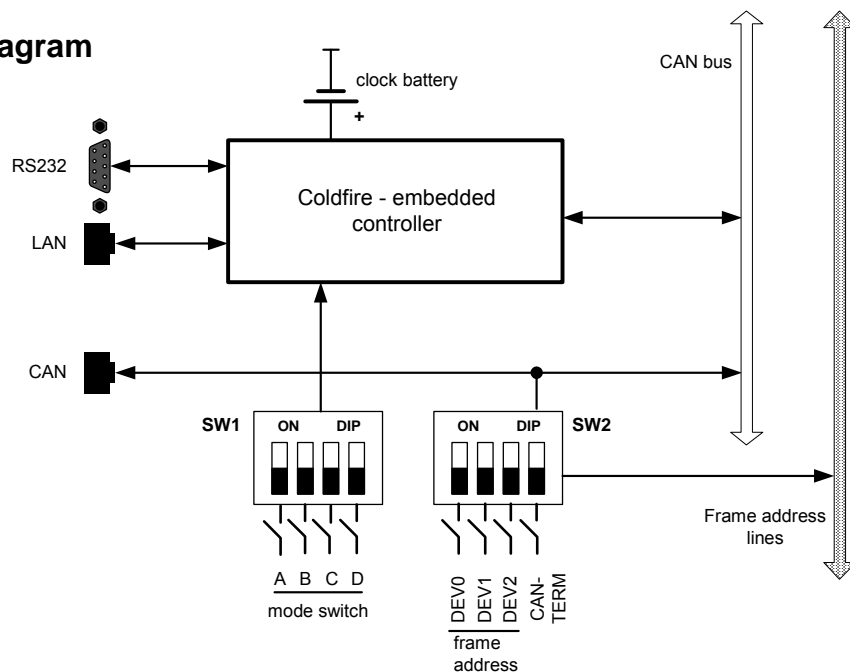
1/7

## Features

- TCP/IP over Ethernet interface
- Transparent CAN “tunnel” for remote control software
- EuCon / Web interface for set up of system
- Front side RJ45 Ethernet connector
- Front side RJ45 CAN connector
- Front side 9-pin serial connector
- Front side init button and status LED
- On board CAN bus frame address setting
- On board CAN bus termination
- On board mode switch



## Block Diagram



## FC972 Remote

2/7

### Operation

- Set the frame address and the CAN termination if necessary / mode switch not used
- Reset the FC-972 any time (STATUS LED lights green): press the INIT button
- To initialize the FC-972 to factory default settings:
  - When power on or after RESET, the STATUS LED will light yellow after 5 seconds.
  - Now press the INIT button and hold it firmly until the STATUS LED flashes 3 times.
  - Afterwards the LED will flash green 3 times to acknowledge the init command and the FC-972 will be initialized to factory default settings
- Remote access by a web browser IE (rev.6.0 or higher) or FIREFOX (rev. 1.0.7 or higher)
- The built-in CAN server tunnels CAN messages via TCP/IP over Ethernet from and to PC based GUI
- For customer application server please contact Euphonix

### General Function

The FC-972 Remote enables remote operation and configuration of any externally configured modules via LAN. Standard remote technologies such as web-browser interface, as well as Eucon control, may be used to interface to modules. AD924, SD942, and SD943 modules require an FC972 to enable access to all on-board functions and parameters.

The controller is a 64 pin dual in-line Single Board Computer based on the Motorola 32 bit MCF5280 “**Coldfire**” engine with an embedded OS (eCos). Internal frame communication is performed via CAN buss with the FC972 providing an external TCP/IP interface to the internal CAN buss. The CAN bus is a simple two-wire differential serial bus capable of operation in noisy electrical environments with a high level of data integrity. It is an open architecture and user-definable transmission medium making it extremely flexible.

Very important is the termination of the transmission medium here to avoid signal degradation reflections.

A RS232 modem interface is reserved for direct access to the controller’s terminal interface.

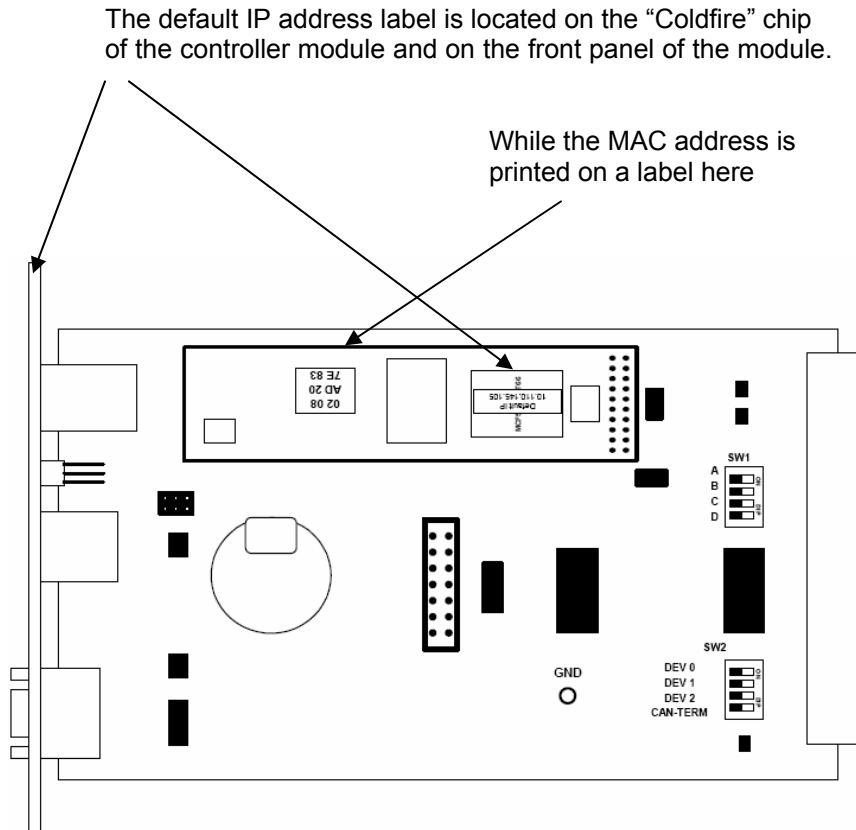
# FC972 Remote

3/7

## Installation

Set **SW1 (A – D)** if necessary (default = off)  
 Set **SW2 (DEV0 – 2)** for an appropriate CAN frame address (default = off).  
 Set **SW2-4 (CAN-TERM)** to terminate the CAN bus if required (default = off)

Location of label switches on the C8702 module.



## Can Buss Termination

Can Buss Termination must be done on either the SY982 Sync or FC972 Remote. Lack of termination or double termination may result in communication errors in the system. Typically, Can Termination is done on the FC972.

## Mode Switches

Mode switch A is set to “ON” for use with Euphonix consoles. Mode switches B, C, & D are set to “OFF”

## Setting the frame ID

Set DEV0, DEV1, & DEV2 to “ON.”



# FC972 Remote

4/7

## Can Buss Termination

Can Buss Termination must be done on either the SY982 Sync or FC972 Remote. Lack of termination or double termination may result in communication errors in the system.

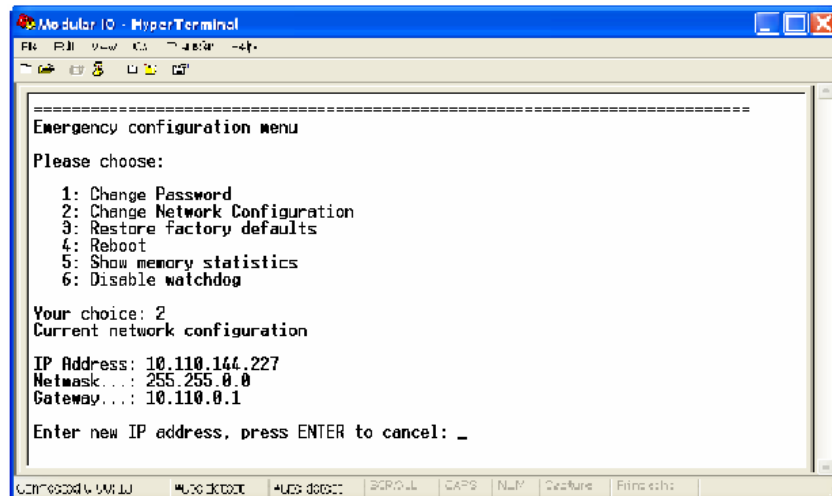
## Software Setup

### Setting the IP address

Each frame controller on a network must have a unique IP, subnet mask and gate way (if necessary). During configuration, FC972 modules are addressed as IP address: 192.168.0.150 (and upward), subnet: 255.255.255.0, gateway 192.168.0.1. To change this, there are two principal methods, via RS232 or via network.

#### IP address setup via RS232

1. Connect a PC's RS232 (COMx) via a 1:1 cable to the module and run a terminal program e.g. Hyperterminal or Minicom (115,200-8-N-1) and press ENTER :
2. Select "2: Network configuration" and make the appropriate settings
3. Select "4: Reboot"



#### IP address setup via network

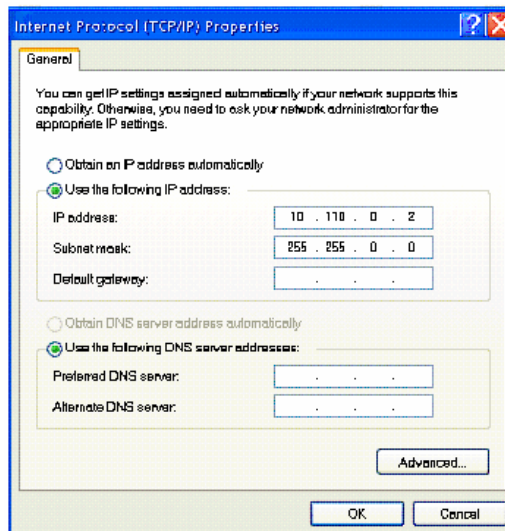
1. Connect the FC972 via an Ethernet cross over cable to a PC.
2. Change the network setting of the PC to the address room of the default IP address of the unit, subnet 255.255.0.0.

*Note: You will find the factory **default IP** address on a label at the controller module (see **Installation**). This address is valid only if the module is initialized to factory default settings using the front-panel INIT button. See **Operation**.*

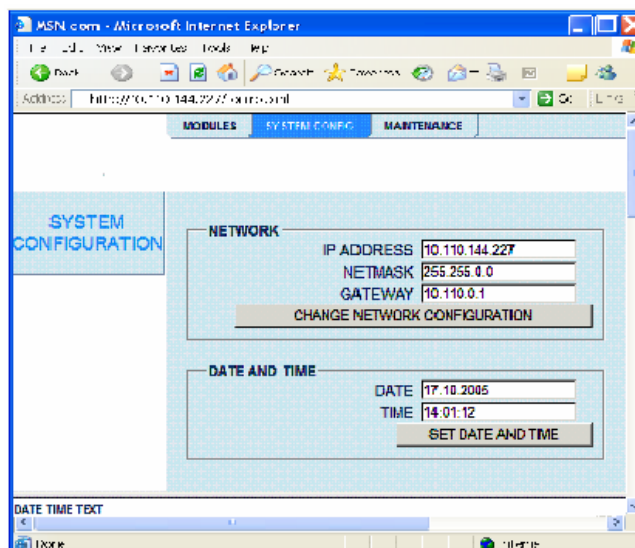
## FC972 Remote

5/7

3. Open a browser and enter the FC-972 default IP address in the URL window (<http://xxx.xxx.xxx.xxx>).



4. On the FC-972 web site go to “**SYSTEM CONFIG**” and make the necessary changes.



## FC972 Remote

6/7

### Update of the Controller Firmware

The firmware for the FC-972 must be “burned” into the flash memory of the controller. Firmware comes as a zip file (compressed) which contains the firmware image. After download (contact Euphonix), the file must be unzipped (“extracted” on PC) saved to a known directory on the configuration PC. The image will be named “xyz.img” where “xyz” stands for the version number.

Next, open the browser and type the IP address of the FC-972 into the URL window. Then go to the > MAINTENANCE > SOFTWARE UPDATE page :

Using the “**SEARCH**” button, select the appropriate image file from the file system of the PC. Then press the “**START UPDATE**” button. The controller will download the image file into its memory and will start the update process automatically. The process takes approximately 3~4 minutes. When finished the browser will show a message that the controller will now reboot. Afterwards you will see the initial web page of the FC-972.

If for any reason (e.g. problems with java script in your actual browser version / configuration) this process is not successful you must reset the FC-972 by power cycling the frame or pressing the INIT button. Now you should open the browser again and connect with the FC-972 webserver.

You must now enter the URL:

<http://<C8702-IP>/standalone-update.html>

Proceed with the image update as described above. When finished you will get a pop up saying the update was o.k. (it takes approx. 4 mins – be patient :-).

**Finally, you must reset the FC-972 manually either by power cycling the frame or pressing the INIT button, because the html file can not do this for you.**

# FC972 Remote

7/7

## Technical Specifications

### Controller module

Micro controller:	MCF8250 "Coldfire"
Flash memory:	8 MByte
RAM:	16 MByte
RTC:	DS 1306
OS:	eCos

### External connectors

LAN (RJ45):	10/100 Mbit/sec Ethernet
RS232 (Sub-D / 9pin):	Controller serial interface 1
CAN (RJ 45):	CAN 1.1 (125kBit/sec)

INIT: The INIT button is reserved for future applications

STATUS LED: The status LED lights yellow for the moment. It is reserved for future applications

### Factory settings

IP address:	10.110.xxx.yyy where xxx and yyy is factory calculated from the MAC address of the unit (to avoid address conflicts when installing systems with multiple frame controllers)
Subnet mask:	255.255.0.0
Gateway:	No entry
Controller ID:	0
Frame address:	0
CAN termination:	Off

### General

Back plane connector:	ref. to DIN41612, 64pin, a+b, male
Power supply:	+5V DC
Consumption:	approx. 300 mA
Dimensions:	3RU, 4HP, 175mm depth
Weight:	~200g

## Connector Pin Assignment

RJ45	LAN	RJ45	CAN	Sub-D	RS232
Pin #	Function	Pin #	Function	Pin #	Function
1	Tx +	1	CAN-H	1	DCD
2	Tx -	2	CAN-L	2	TxD
3	Rx +	3		3	RxD
4		4	GND	4	DTR
5		5	GND	5	GND
6	Rx -	6		6	DSR
7		7		7	CTS
8		8		8	RTS
				9	N.C.

## WC984 4ch WCLK Out

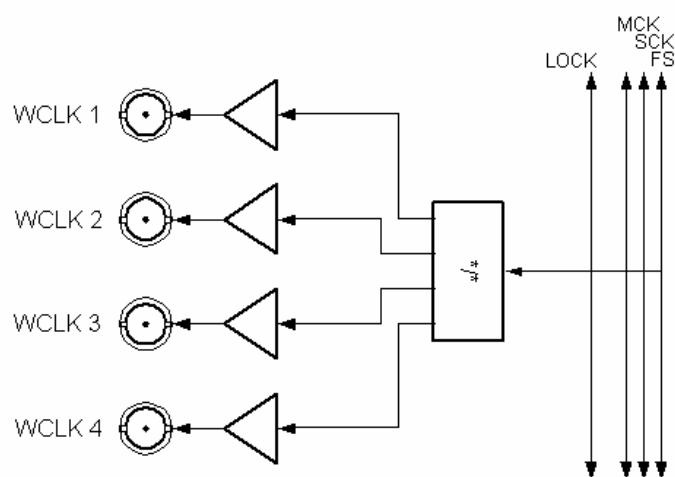
1/2

### Features

- sync output module for Modular I/O system
- 4x buffered Word Clock outputs
- frame sync buss provides the sync source
- sync output for sync-to-MADI frames



### Block Diagram



## WC984 4ch WCLK Out

2/2

### Specifications

WCLK output: following C8000 system clock 44.1 . 96kHz  
Connector: BNC, 75Ohm, coaxial  
level: TTL-level  
output format: Wordclock

#### GENERAL

backplane connector: ref. to DIN41612, 64pin, a+b, male  
power supply: +5V DC  
consumption: appr. 100 mA  
dimensions: 3RU, 4HP, 175mm depth  
weight: ~150g

### Installation

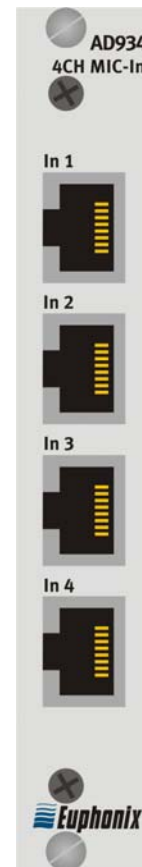


# AD914 4ch Microphone Input

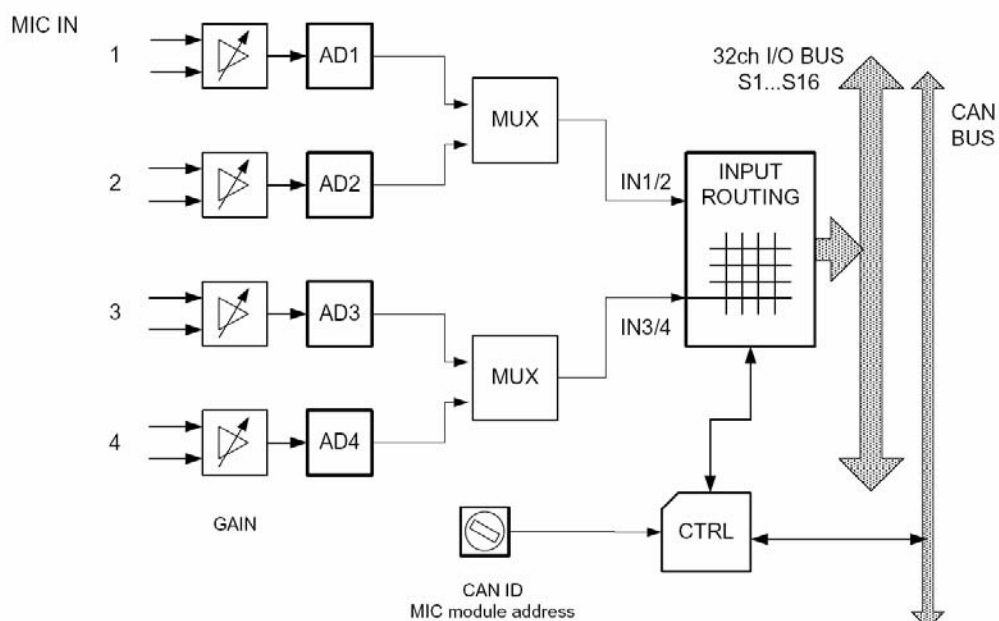
1/2

## Features

- 4ch high quality MIC input
- 24bit sigma-delta A/D-converter, sample rate up to 96kHz
- digitally controlled gain 0..+65dB
- max. line input level +20dBu
- pad attenuation -10dB
- floating balanced analog inputs
- electrical isolation between channels
- 48V phantom power
- remote operation via Eucon or web browser interface of up to 256 microphone inputs in a system (64 devices)



## Block Diagram



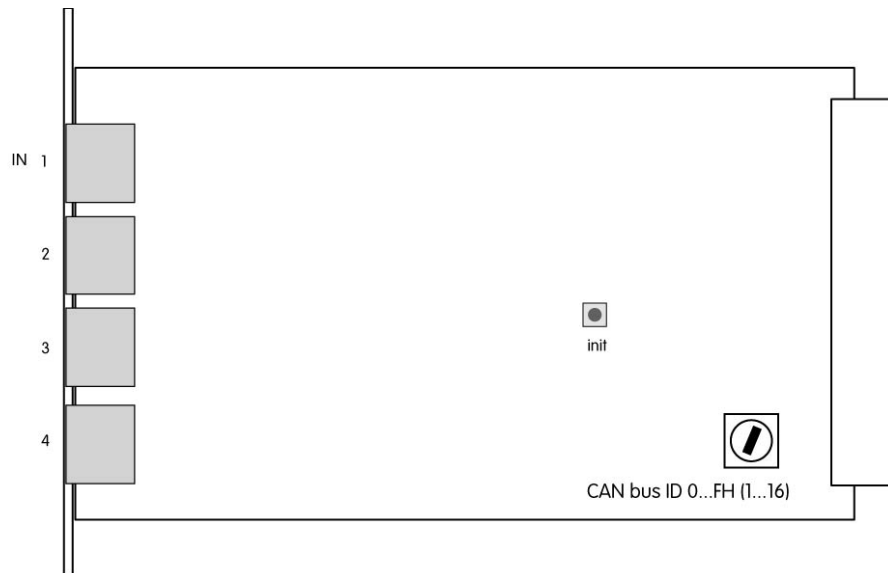
# AD914 4ch Microphone Input

2/2

## Technical Specifications

dynamic range	110dB (RMS)	digital output:	
max. input level	+20dBu	resolution	24bit
THD+N	<0.09% @ max. input level	sample rate	32...96kHz
		gain	0, +10...+65dB, in 1dB steps
equiv. Input noise @ 200 Ohm 40dB gain	126,5dB (RMS)	backplane connector:	
		ref. to DIN41612	64pin, a+b, male
		power supply	+5V DC
		consumption	appr. 1300 mA
		dimensions	3RU, 4HP, 175mm dept
		weight	~300g
frequency response	10Hz (-3dB)...20kHz (-0,5dB) (FS=48kHz) 10Hz (-3dB)...40kHz (-0,5dB) (FS=96kHz)		
crosstalk	>90dB (20kHz)		
CMR	>80dB (20kHz)		
input impedance	9 kOhm, differential		
RJ-45 connector	4,5-screen, 3-live, 6-return		

## Installation



### Local Setup

**CAN – ID:** Rotary switch to set the module ID (0...F)

**INIT:** Initialization the card, all user settings will be replaced by factory default!!

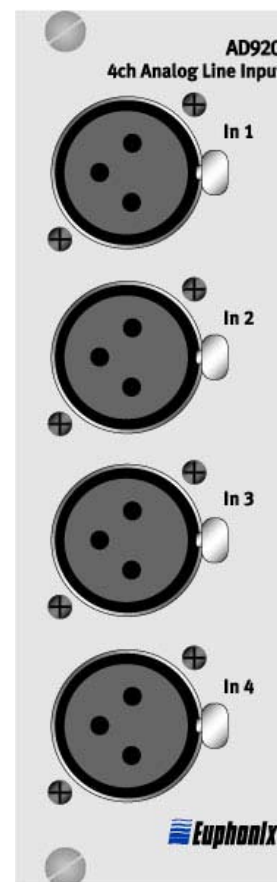


## AD920 4ch Analog Line Input

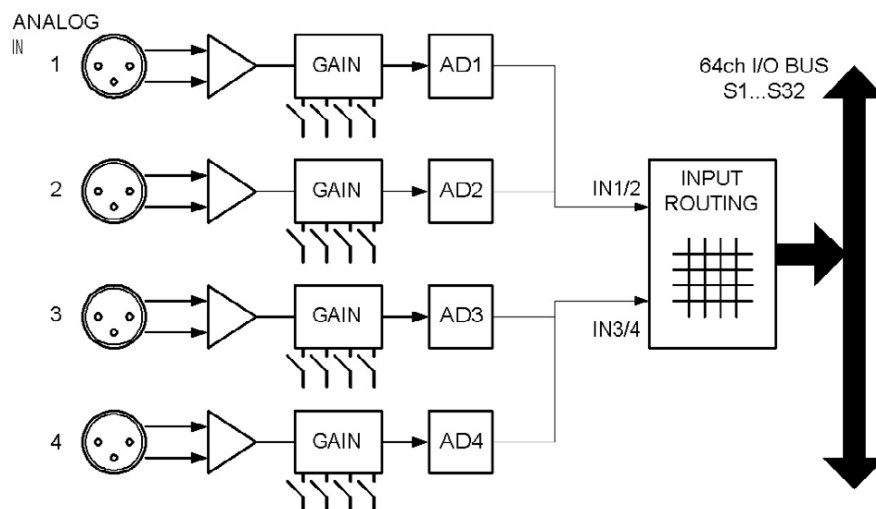
1/2

### Features

- 4ch A/D-converter
- 24bit sigma-delta A/D converter
- sample rate up to 96kHz
- sophisticated circuit design
- balanced analog inputs
- electrical isolation between channels (floating)



### Block Diagram



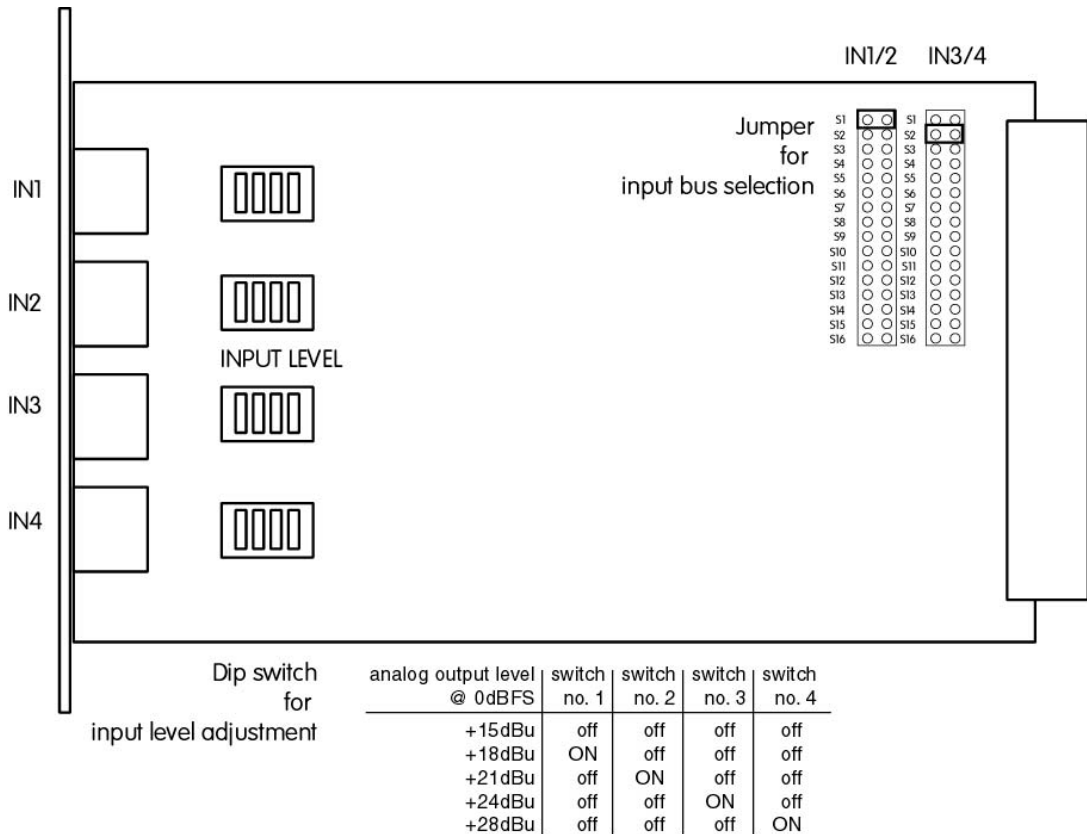
AD920 4ch Analog Line Input

2/2

Specifications

resolution	24bit
sample rate	32...96kHz
dynamic range	113dB (RMS) 116dB (A)
THD+N	<0.002% @ max. input level
frequency response	20Hz...20kHz (FS=48kHz)
(+/-0.5dB)	20Hz...40kHz (FS=96kHz)
crosstalk	>100dB (1kHz) >95dB (20kHz) >85dB (40kHz)
max. input level	+15...+28dBu @ 0dBFS
input impedance	10 kOhm, floating balanced
connector	XLR, 1-screen, 2-live, 3-return
backplane connector	ref. to DIN41612, 64pin, a+b, male
power supply	+5V DC
consumption	appr. 850 mA
dimensions	3RU, 8HP, 175mm depth
weight:	~200g

Installation

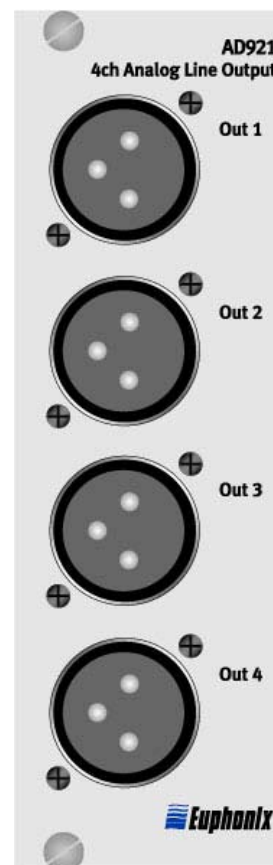


# DA921 4ch Analog Line Output

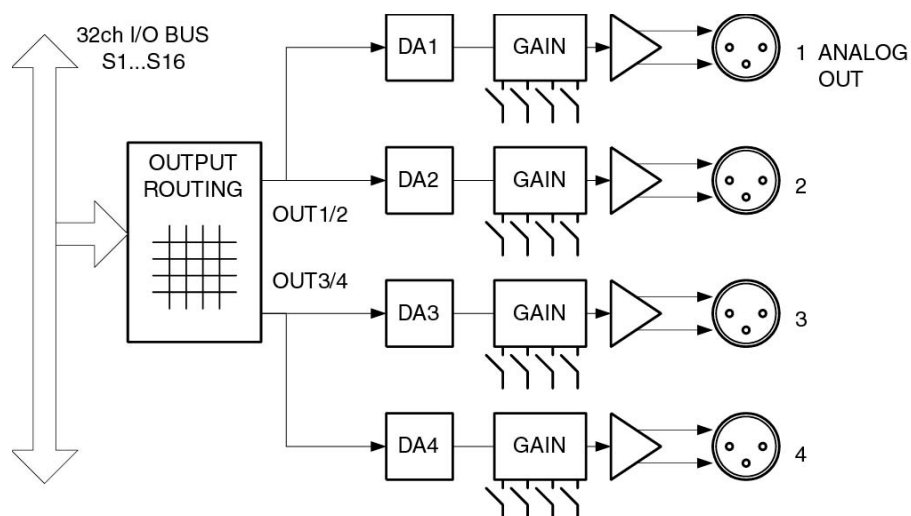
1/2

## Features

- 4ch D/A-converter
- 24bit sigma-delta D/A converter
- sample rate up to 96kHz
- sophisticated circuit design
- balanced analog outputs
- electrical isolation between channels (floating)



## Block Diagram



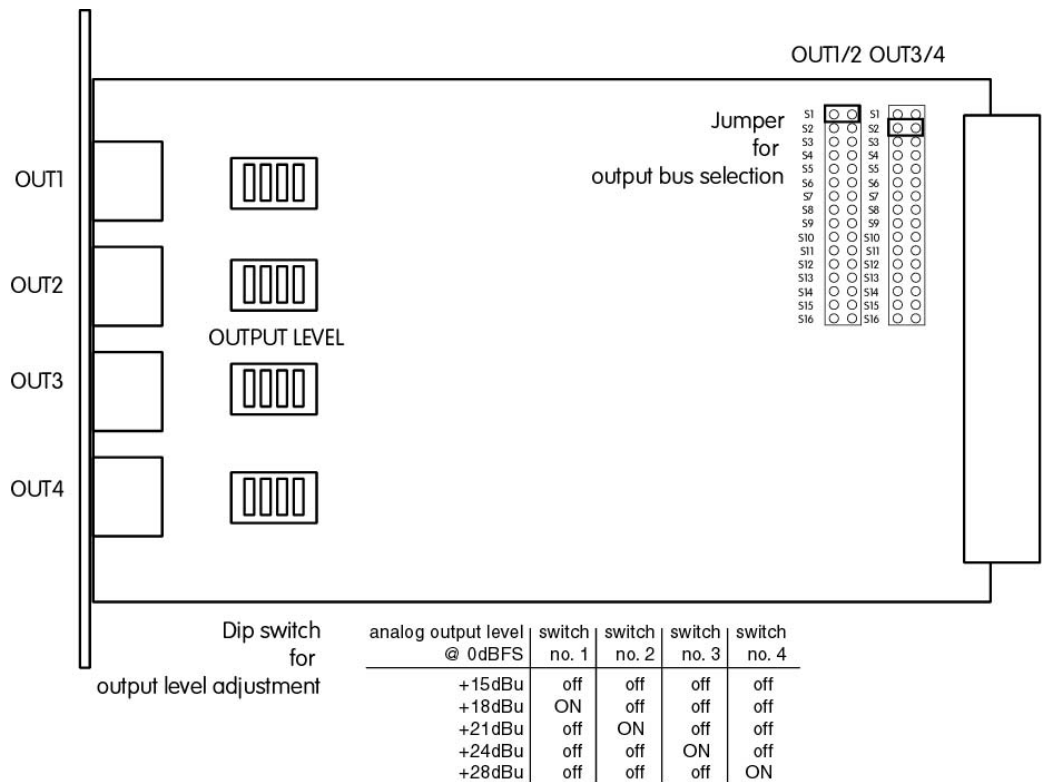
DA921 4ch Analog Line Output

2/2

Technical Specifications

resolution	24bit
sample rate	32...96kHz
dynamic range	112dB (RMS)
	117dB (A)
THD+N	<0.002% @ max. output level
frequency response	20Hz...20kHz (FS=48kHz)
(+/-0.5dB)	20Hz...40kHz (FS=96kHz)
crosstalk	>110dB (1kHz)
	>105dB (20kHz)
	>90dB (40kHz)
max. output level	+15...+28dBu @ 0dBFS
output impedance	60 Ohm, floating balanced
connector	XLR, 1-screen, 2-live, 3-return
backplane connector	ref. to DIN41612, 64pin, a+b, male
power supply	+5V DC
consumption	appr. 650 mA
dimensions	3RU, 8HP, 175mm depth
weight:	~200g

Installation



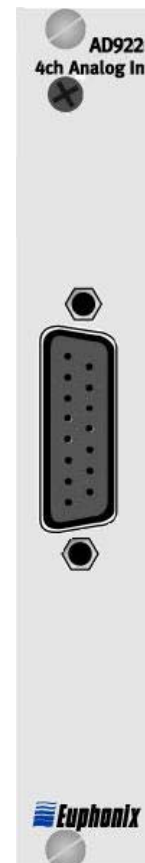
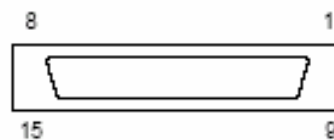
# AD922 4ch Analog Line Input

1/2

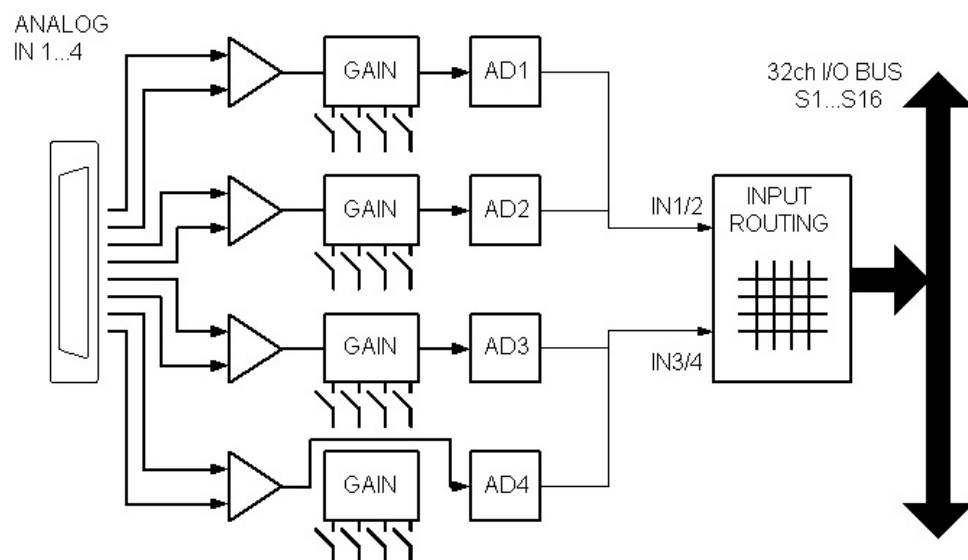
## Features

- 4ch A/D-converter
- 24bit sigma-delta A/D converter
- sample rate up to 96kHz
- sophisticated circuit design
- balanced analog inputs
- electrical isolation between channels (floating)

input	+U <sub>e</sub>	-U <sub>e</sub>	Ground
1	pin 9	pin 1	pin2, pin10
2	pin 11	pin 3	pin4, pin12
3	pin 6	pin 13	pin5
4	pin 8	pin 15	pin7, pin14



## Block Diagram



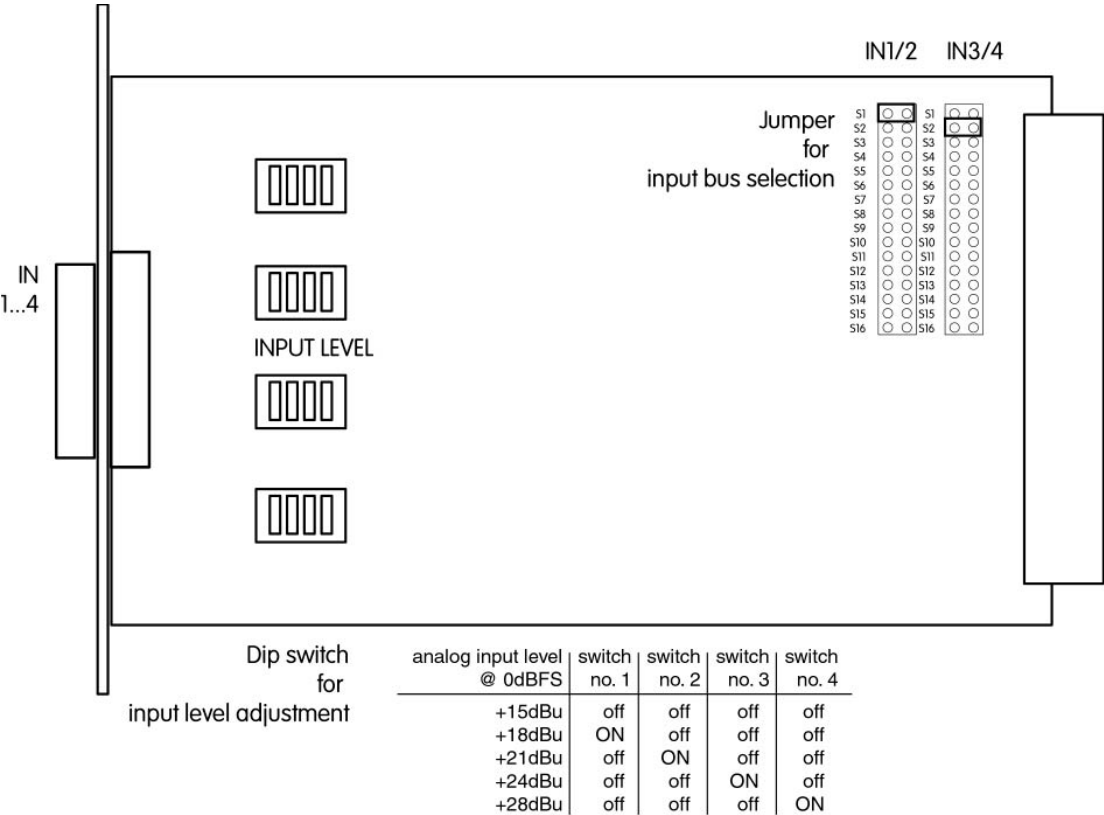
AD922 4ch Analog Line Input

2/2

Specifications

resolution	24bit
sample rate	32...96kHz
dynamic range	113dB (RMS) 116dB (A)
THD+N	<0.002% @ max. input level
frequency response	20Hz...20kHz (FS=48kHz)
(+/-0.5dB)	20Hz...40kHz (FS=96kHz)
crosstalk	>100dB (1kHz) >95dB (20kHz) >85dB (40kHz)
max. input level	+15...+28dBu @ 0dBFS
input impedance	10 kOhm, floating balanced
connector	15-pin DSub, female panel
backplane connector	ref. to DIN41612, 64pin, a+b, male
power supply	+5V DC
consumption	appr. 850 mA
dimensions	3RU, 4HP, 175mm depth
weight:	~200g

Installation



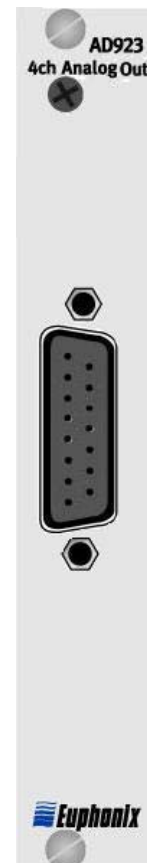
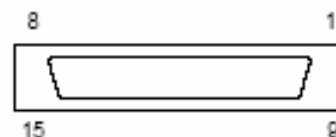
# DA923 4ch Analog Line Output

1/2

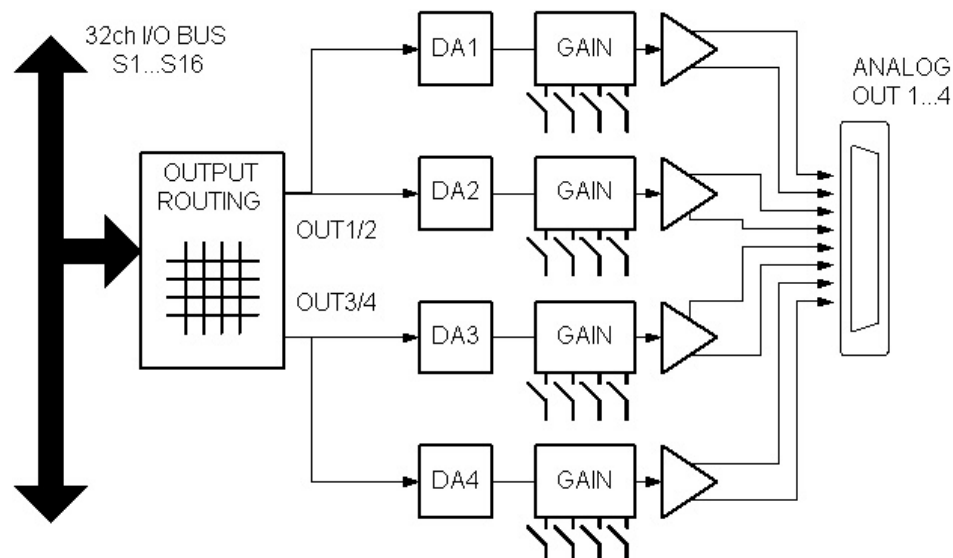
## Features

- 4ch D/A-converter
- 24bit sigma-delta D/A converter
- sample rate up to 96kHz
- sophisticated circuit design
- balanced analog outputs
- electrical isolation between channels (floating)

input	+Ue	-Ue	Ground
1	pin 9	pin 1	pin2, pin10
2	pin 11	pin 3	pin4, pin12
3	pin 6	pin 13	pin5
4	pin 8	pin 15	pin7, pin14



## Block Diagram



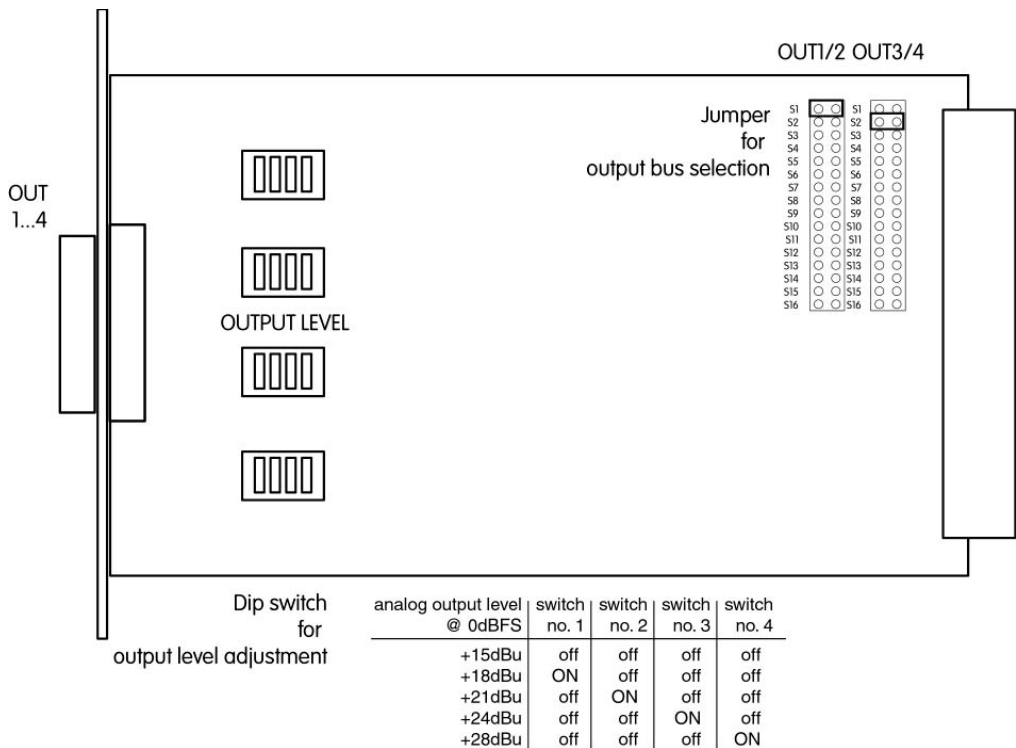
DA923 4ch Analog Line Output

2/2

Technical Specifications

resolution	24bit
sample rate	32...96kHz
dynamic range	112dB (RMS)
	117dB (A)
THD+N	<0.002% @ max. output level
frequency response	20Hz...20kHz (FS=48kHz)
(+/-0.5dB)	20Hz...40kHz (FS=96kHz)
crosstalk	>110dB (1kHz)
	>105dB (20kHz)
	>90dB (40kHz)
max. output level	+15...+28dBu @ 0dBFS
output impedance	60 Ohm, floating balanced
connector	15-pin DSub, female panel
backplane connector	ref. to DIN41612, 64pin, a+b, male
power supply	+5V DC
consumption	appr. 650 mA
dimensions	3RU, 4HP, 175mm depth
weight:	~200g

Installation



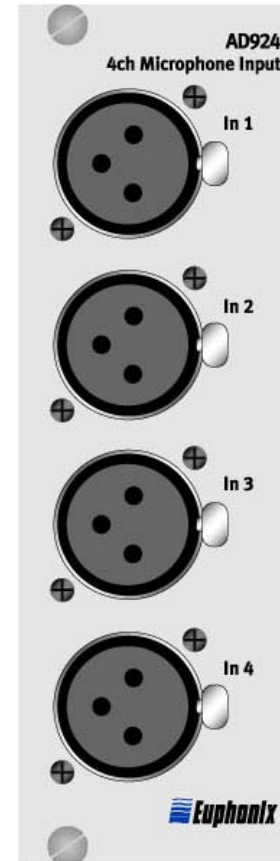


# AD924 4ch Microphone Input

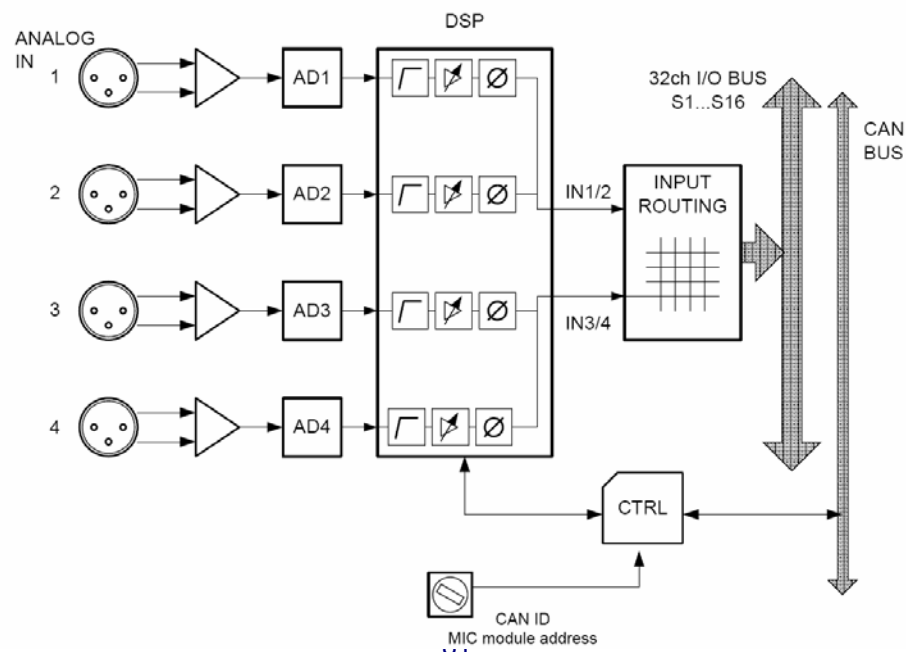
1/2

## Features

- 4ch high performance mic input
- 24bit sigma-delta A/D converter
- sample rate up to 96kHz
- 142dB dynamic range (greater than conventional preamps)
- digital gain setting 0...70dB
- digital audio processing (gain, subsonic filter, phase reverse)
- sophisticated circuit design
- balanced analog inputs
- electrical isolation between channels (floating)
- 48v phantom power
- remote operation via Eucon or web browser interface of up to 256 microphone inputs in a system (64 devices)



## Block Diagram



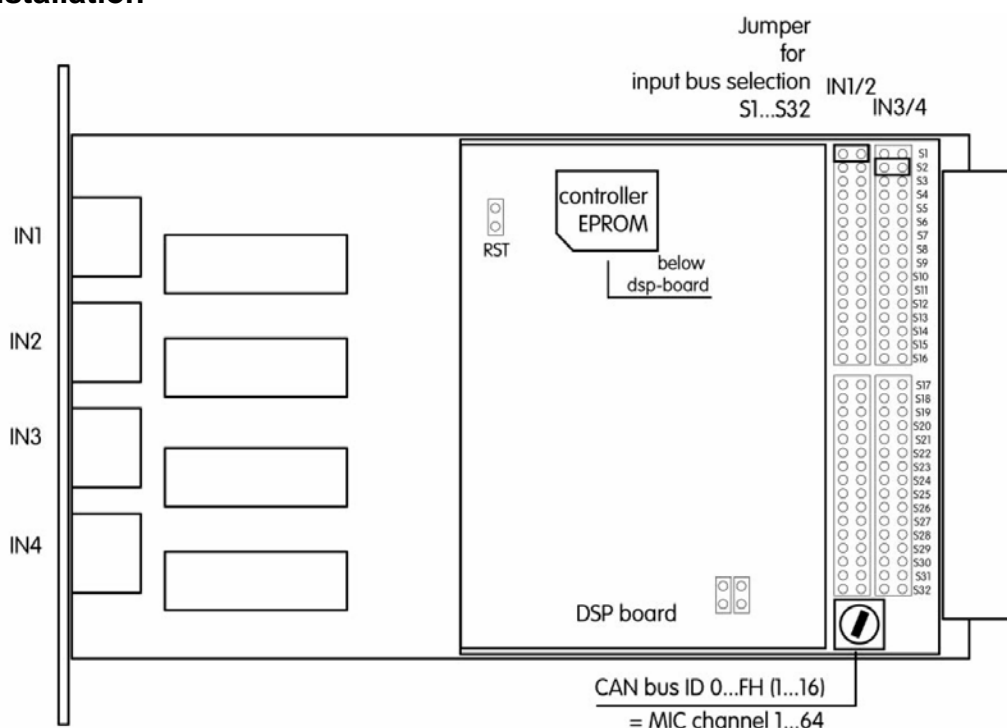
# AD924 4ch Microphone Input

2/2

## Technical Specifications

dynamic range	142dB (RMS)
max. input level	+18dBu @ 0dBFS
THD+N	<0.002% @ max. input level
equiv. input noise	127dB(RMS)
@ 200 Ohm	129dB (A)
	115dBqp (CCIR)
digital output	
resolution	24 bit
sample rate	32..96kHz
gain	0...+70dB, in 1dB steps
low cut filter	18dB/oct
	5, 40, 60, 80, 100, 120, 150 Hz
frequency response	5Hz...20kHz (FS=48kHz)
	(+/-0.5dB)
	5Hz...40kHz (FS=96kHz)
crosstalk	>95dB (20kHz)
CMR	>80dB (20kHz)
input impedance	6,5kOhm, floating balanced
connector	XLR, 1-screen, 2-live, 3-return
backplane connector	ref. to DIN41612, 64pin, a+b, male
power supply	+5V DC
consumption	appr. 1100 mA
dimensions	3RU, 8HP, 175mm depth
weight:	~300g

## Installation

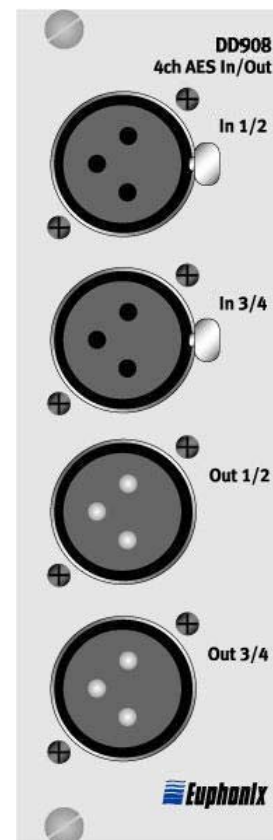


## DD908 4ch AES In/Out

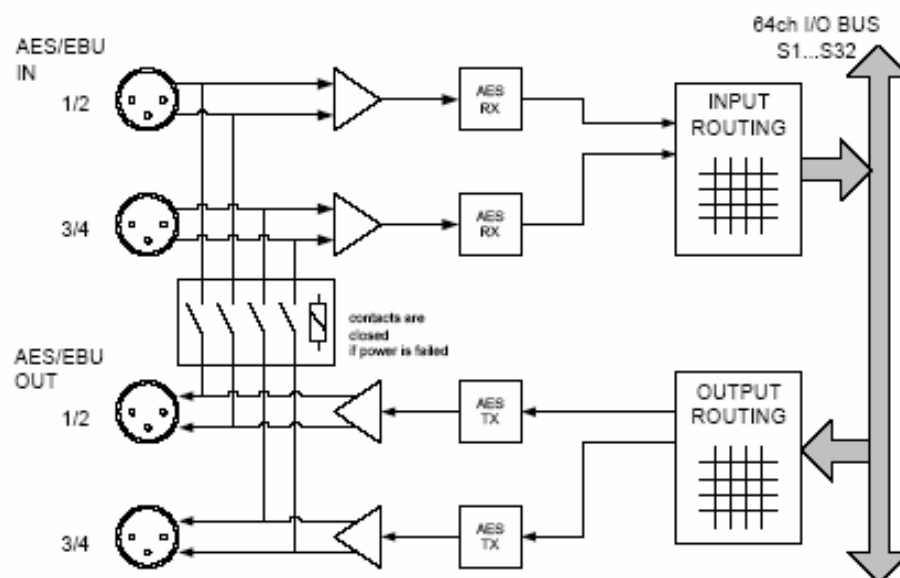
1/2

### Features

- 4ch AES/EBU input/output interface
- sample rate up to 96kHz
- sophisticated circuit design
- XLR input and output at 110Ohm
- hardware bypass: relays connect related inputs and outputs if power fails
- sample rate converters on inputs



### Block Diagram



# DD908 4ch AES In/Out

2/2

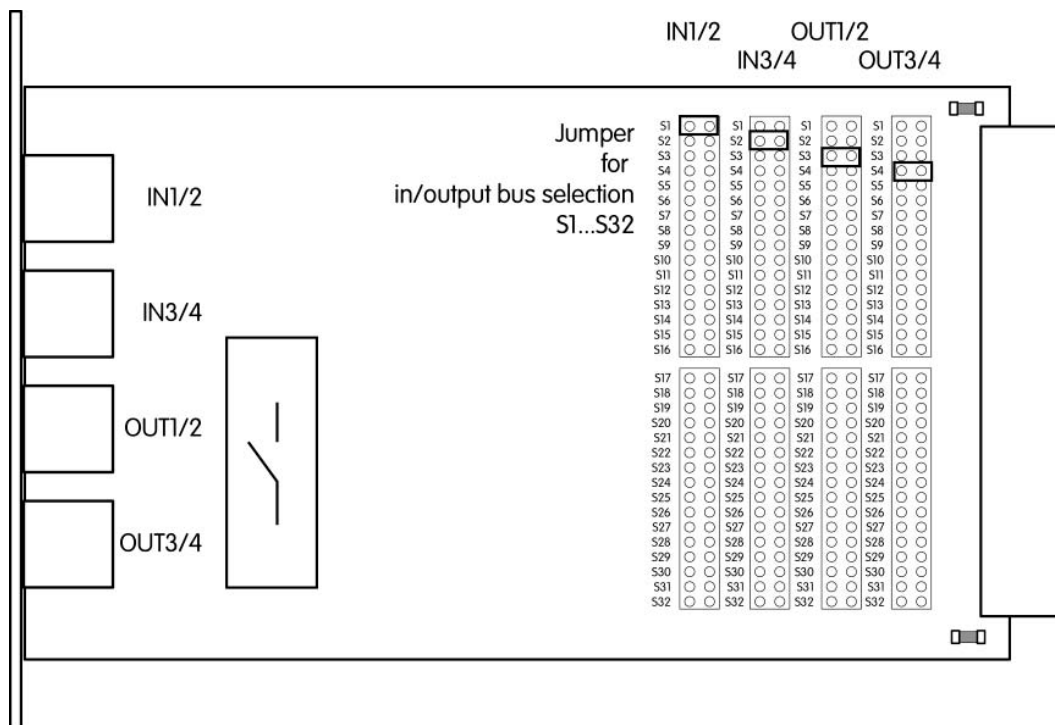
## Technical Specifications

### AES/EBU

input format	AES professional, AES consumer
output format	transparent, same as related input
resolution	24bit
sample rate	32...96kHz
connector	XLR, 1-screen, 2-live, 3-return
level	0,5 ... 5 Vpp

backplane connector	ref. to DIN41612, 64pin, a+b, male
power supply	+5V DC
consumption	appr. 100 mA
dimensions	3RU, 8HP, 175mm depth
weight:	~200g

## Installation

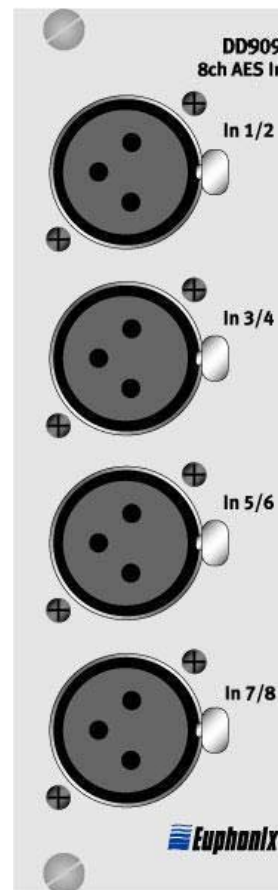
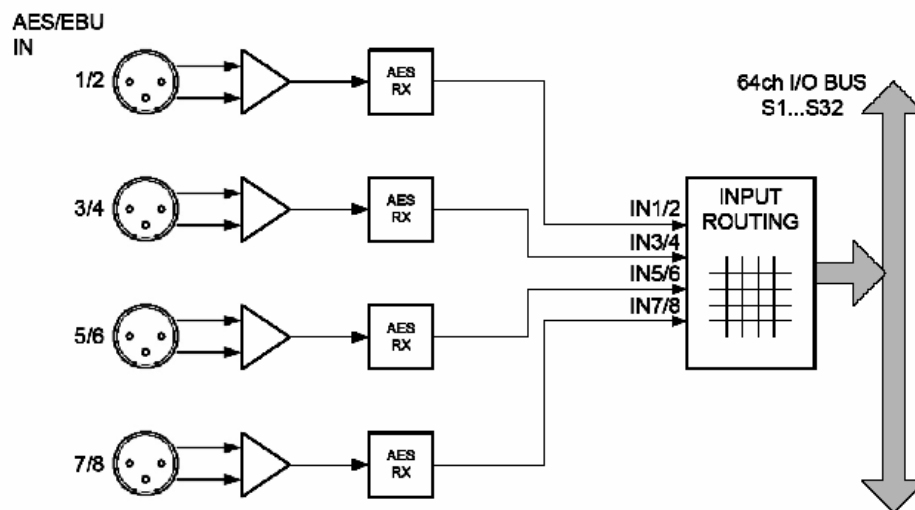


**DD909 8ch AES In**

1/2

**Features**

- 8ch AES/EBU input interface
- sample rate up to 96kHz
- sophisticated circuit design
- XLR inputs at 110Ohm
- sample rate converters

**Block Diagram**

# DD909 8ch AES In

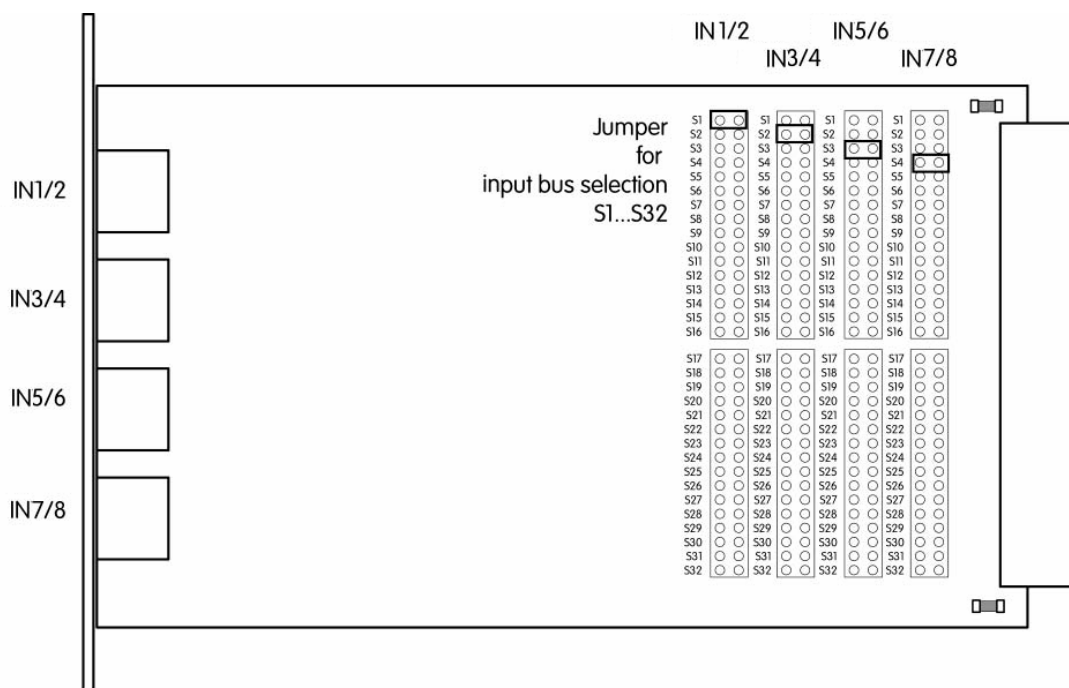
2/2

## Technical Specifications

### AES/EBU

input format	AES professional, AES consumer
resolution	24bit
sample rate	32...96kHz
connector	XLR, 1-screen, 2-live, 3-return
level	0,5 ... 5 Vpp
backplane connector	ref. to DIN41612, 64pin, a+b, male
power supply	+5V DC
consumption	appr. 100 mA
dimensions	3RU, 8HP, 175mm depth
weight	~200g

## Installation

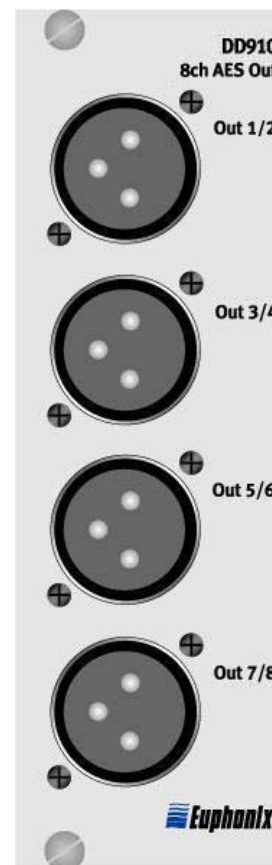


## DD910 8ch AES Out

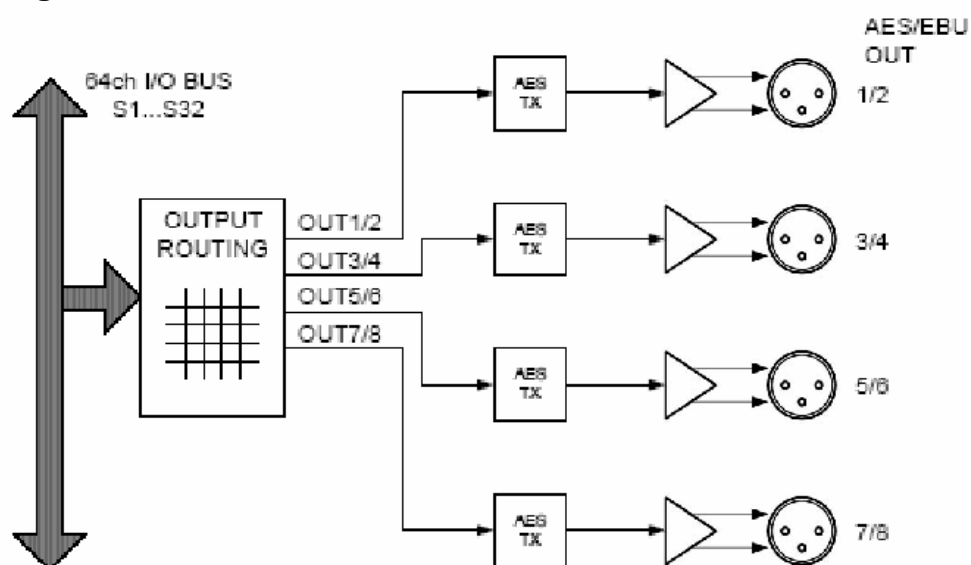
1/2

### Features

- 8ch AES/EBU output interface
- sample rate up to 96kHz, following the system clock
- sophisticated circuit design
- XLR outputs at 110Ohm



### Block Diagram



# DD910 8ch AES Out

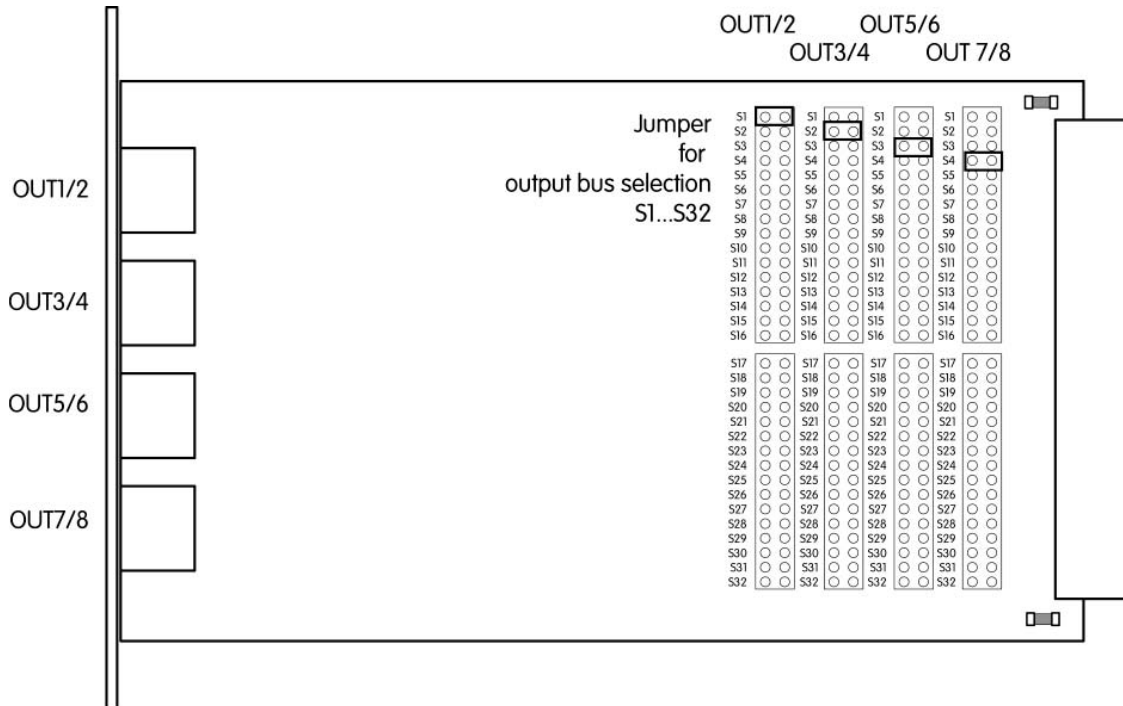
2/2

## Technical Specifications

### AES/EBU

output format	transparent, as connector input
resolution	24bit
sample rate	32...96kHz, following the system clock
connector	XLR, 1-screen, 2-live, 3-return
level	0,5 ... 5 Vpp
backplane connector	ref. to DIN41612, 64pin, a+b, male
power supply	+5V DC
consumption	appr. 100 mA
dimensions	3RU, 8HP, 175mm depth
weight	~200g

## Installation





## DD911 4ch AES In/Out

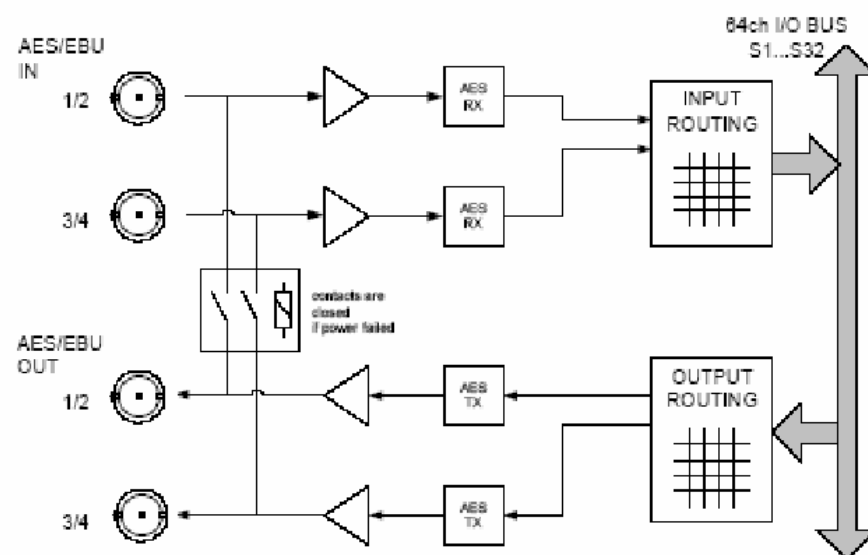
1/2

### Features

- 4ch AES/EBU input/output interface
- sample rate up to 96kHz
- sophisticated circuit design
- coaxial input and output at 75Ohm
- hardware bypass: relays connect related inputs and outputs if power fails
- sample rate converters on inputs



### Block Diagram



# DD911 4ch AES In/Out

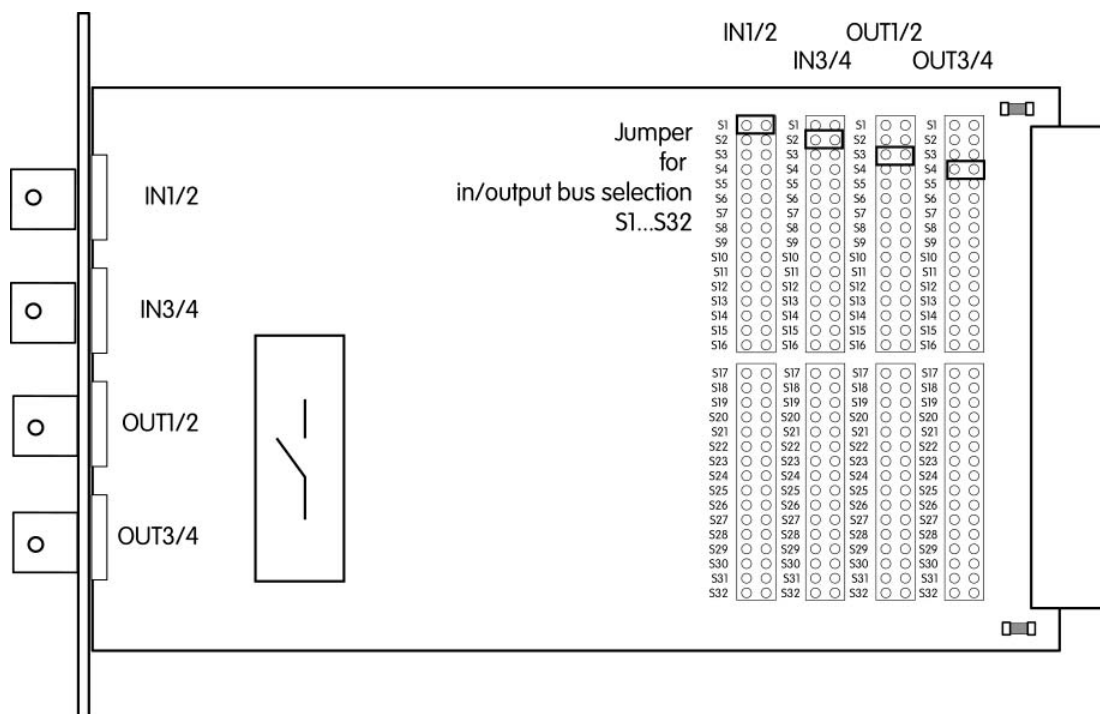
2/2

## Technical Specifications

### AES/EBU

input format	AES professional, AES consumer
output format	transparent, same as related input
resolution	24bit
sample rate	32...96kHz
connector	BNC, 75Ohm, coaxial
level	0,5 ... 5 Vpp
backplane connector	ref. to DIN41612, 64pin, a+b, male
power supply	+5V DC
consumption	appr. 100 mA
dimensions	3RU, 4HP, 175mm depth
weight	~150g

## Installation



## DD912 8ch AES In

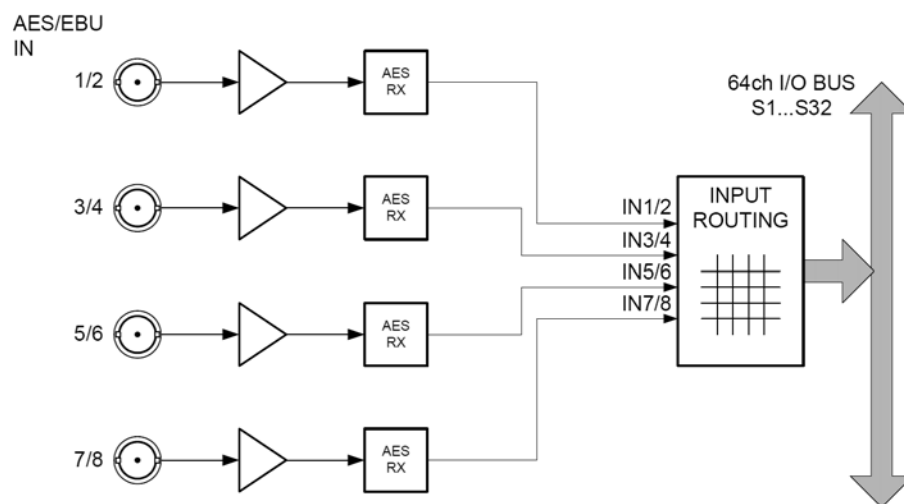
1/2

### Features

- 8ch AES/EBU input interface
- sample rate up to 96kHz
- sophisticated circuit design
- coaxial input at 75Ohm
- sample rate converters



### Block Diagram



# DD912 8ch AES In

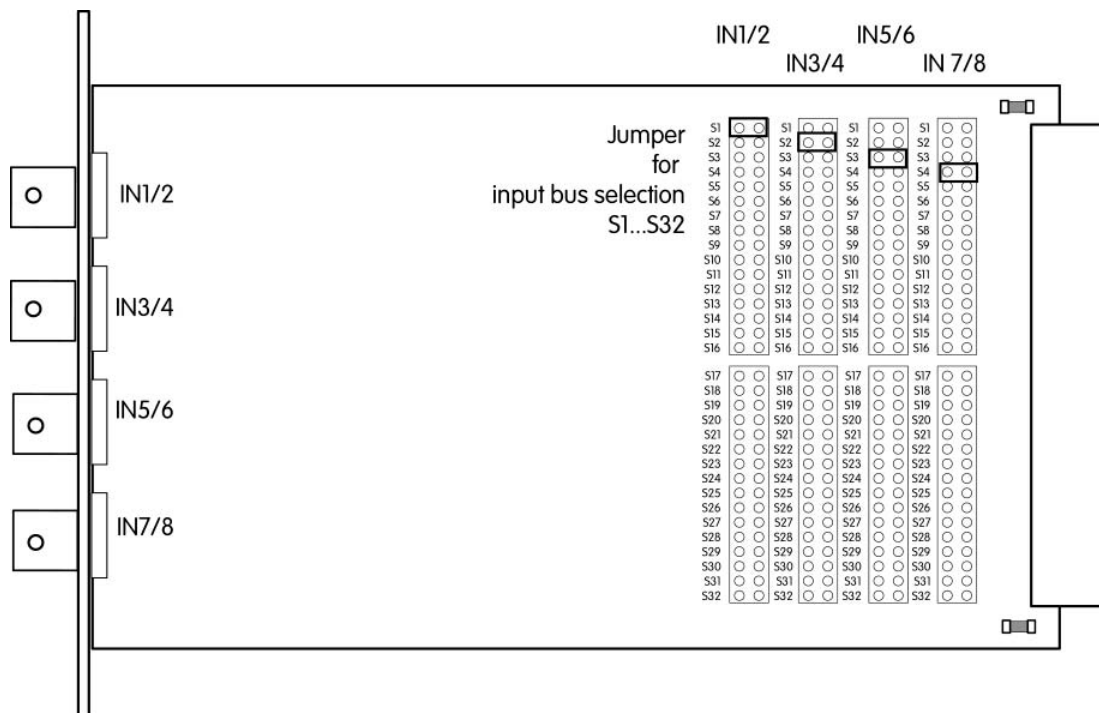
2/2

## Technical Specifications

### AES/EBU

input format	AES professional, AES consumer
resolution	24bit
sample rate	32...96kHz
connector	BNC, 75Ohm, coaxial
level	0,5 ... 5 Vpp
backplane connector	ref. to DIN41612, 64pin, a+b, male
power supply	+5V DC
consumption	appr. 100 mA
dimensions	3RU, 4HP, 175mm depth
weight	~150g

## Installation



## DD913 8ch AES Out

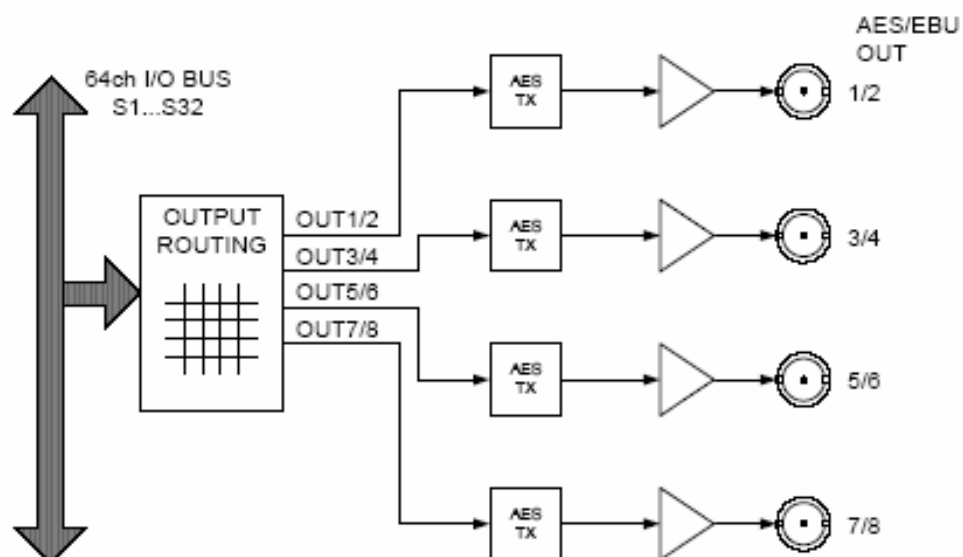
1/2

### Features

- 8ch AES/EBU output interface
- sample rate up to 96kHz, following the system clock
- sophisticated circuit design
- coaxial input at 75Ohm



### Block Diagram



# DD913 8ch AES Out

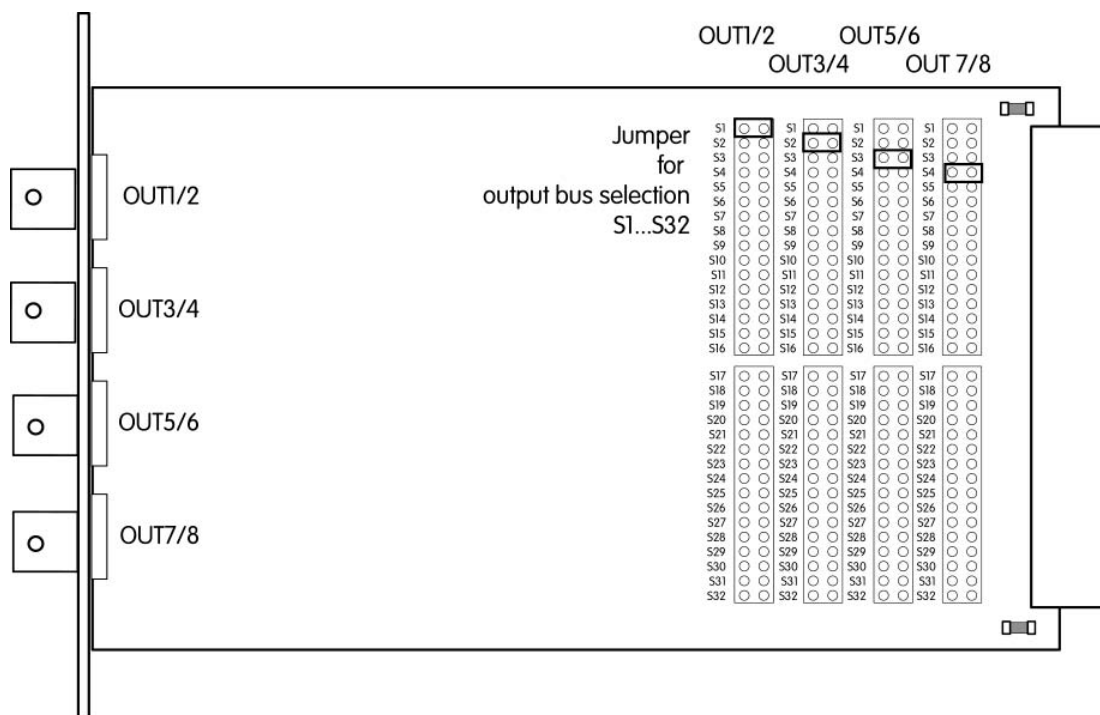
2/2

## Technical Specifications

### AES/EBU

output format	transparent, as connector input
resolution	24bit
sample rate	32...96kHz, following the system clock
connector	BNC, 75Ohm, coaxial
level	0,5 ... 5 Vpp
backplane connector	ref. to DIN41612, 64pin, a+b, male
power supply	+5V DC
consumption	appr. 100 mA
dimensions	3RU, 4HP, 175mm depth
weight	~150g

## Installation

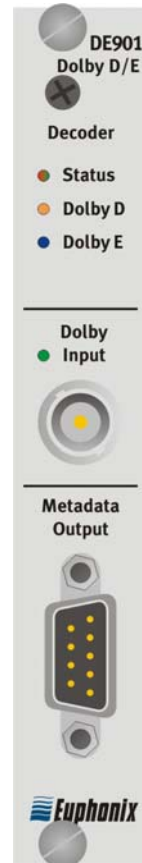


## DE901 Dolby D/E Decoder

1/2

### Features

- (N/A at time of writing)



### Block Diagram

(N/A at time of writing)

---

---

<b>DE901 Dolby D/E Decoder</b>
--------------------------------

2/2

**Technical Specifications**

(N/A at time of writing)

---

**Installation**

(N/A at time of writing)

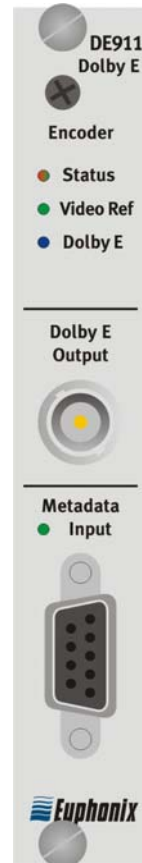


# DE911 Dolby E Encoder

1/2

## Features

- (N/A at time of writing)



## Block Diagram

(N/A at time of writing)

---

---

## DE911 Dolby E Encoder

2/2

### Technical Specifications

(N/A at time of writing)

---

### Installation

(N/A at time of writing)

# DE912 Dolby D+ Encoder

1/2

## Features

- (N/A at time of writing)



## Block Diagram

(N/A at time of writing)

---

---

## DE912 Dolby D+ Encoder

2/2

### Technical Specifications

(N/A at time of writing)

---

### Installation

(N/A at time of writing)

# SD941 4ch SD De/Embedder

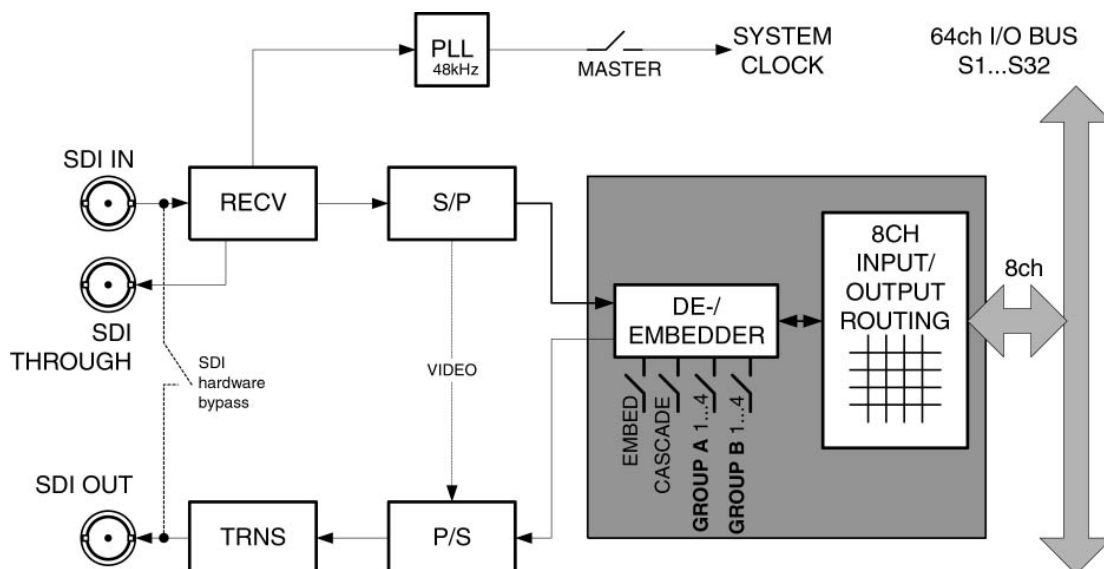
1/4

## Features

- interface for embedded audio in SDI signals (270MB/s)
- 4ch embedder/deembedder
- audio group selection
- channel swap (1<->2; 3<->4)
- pair swap (1/2<->3/4)
- MASTER mode: system can lock to SDI input
- pack mode: highest density of 16 embedded audio channels
- cascade function for insertion of more than one audio group into one SDI signal



## Block Diagram



# SD941 4ch SD De/Embedder

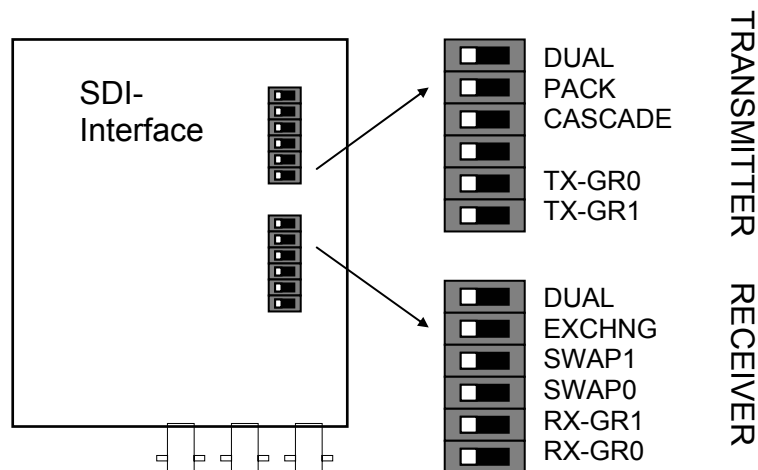
2/4

## Technical Specifications

SDI interface with Audio Embedder/Deembedder function

standard:	SMPTE 272 M - AB, 270Mb/s, 525/625 component
connection:	BNC, 75 Ohm, coaxial (SDI through: active loop, reclocked)
signal level:	800mV $\pm 10\%$
equalisation:	appr. to 180m (Belden)
audio data format:	20bit
backplane connector:	ref. to DIN41612, 64pin, a+b, male
power supply:	+5V DC
consumption:	appr. 800 mA
dimensions :	3RU, 4HP, 175mm depth
weight :	~300g

## Installation



### DUAL

-both **DUAL** switches should be OFF all the time

### PACK

- generates a new audio frame structure, deleting all former existing embedded audio
- embeds selected TX group as the first audio group within SDI stream (TX group typically set to Group 1)
- necessary if no audio was embedded before

# SD941 4ch SD De/Embedder

3/4

## CASCADE

- generates a new audio group as selected (TX group) within existing frame structure. This overwrites all data of this group if it was already embedded previously.
- necessary if a new group should be embedded and if audio in other groups was embedded previously
- matches the structure which was generated by PACK mode. It is recommended to use PACK mode for generating audio structure and embedding the first group before using CASCADE to embed further audio groups.

## RX-GR0/RX-GR1 (Receiver Group Select)

- use the table below to select receive group

## TX-GR0/TX-GR1 (Transmitter Group Select)

- in **PACK** or **CASCADE** mode, use the table below to select the transmit group
- if neither **PACK** nor **CASCADE** mode is selected, the transmit group is determined by the receiver group setting (**TRANSPARENT** mode)

	GR0	GR1
group 1	-	-
group 2	ON	-
group 3	-	ON
group 4	ON	ON

## SWAP0

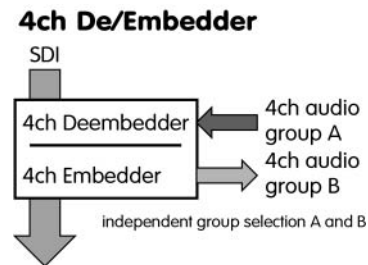
- Swaps receive channels 1 & 2

## SWAP1

- Swaps receive channels 3 & 4

## EXCHNG

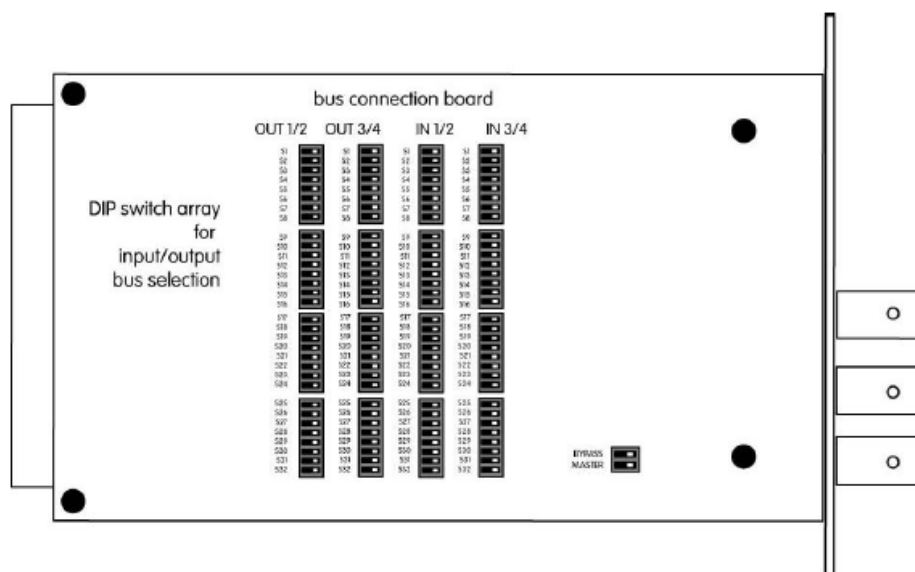
- Swaps receive pairs 1/2 & 3/4



*Note: If **PACK** and **CASCADE** are not set the embedder will insert into the group determined by the RX group selection. If RX group 1 is selected and no audio structure exists at the input, the embedder will automatically switch to PACK mode and embed into group 1 (**AUTO-PACK** mode). However, if RX group 2, 3, or 4 is selected and no audio exists on the selected group at the input, no audio will be embedded. **PACK** or **CASCADE** mode must be selected.*

# SD941 4ch SD De/Embedder

4/4



## BYPASS

-Connects the SDI Out directly to the SDI In bypassing the Embedder

## MASTER

-Allows the SD941 to be used as the frame's master sync source. Clock is derived from the module's SDI Input. The module must be installed in one of the four reserved slots on the rear-plane. An SY982 Sync module should not be installed simultaneously in the frame.



# SD942 8ch SD De/Embedder

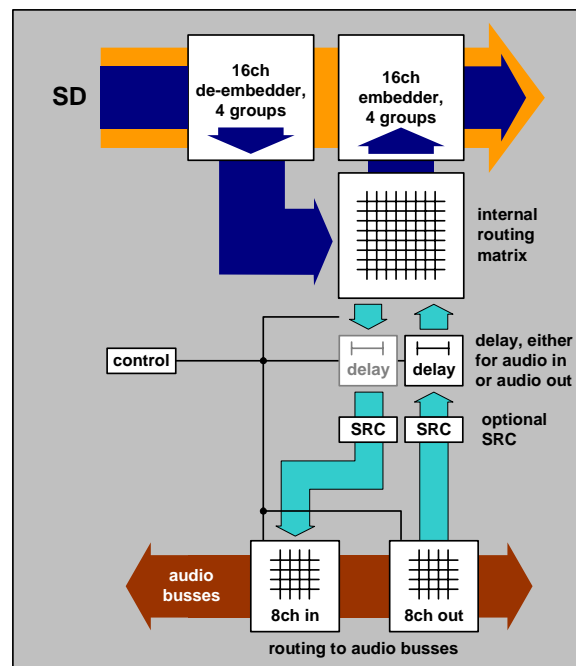
1/4

## Features

- interface for embedded audio in SDI signals (270MB/s)
- 8ch embedder/deembedder
- 2 SDI outputs
- bypass relay for SDI IN >>> SDI OUT1
- bit transparent for coded data streams (e.g. Dolby E)
- de-embedder :
  - de-embedding of all 4 groups simultaneously
  - user selectable routing of up to 8 mono channels to audio busses
- embedder :
  - user selectable embedding of up to 4 groups
  - routing of up to 8 audio channels from audio busses
- MASTER mode: system can lock to SD input
- sample rate converter (optional) for non-synchronized SDI signals
- audio delay: 8 x 240 ms in increments of 1 ms
  - delay available either in de-embedder or embedder
- video test pattern generator for SD:
  - auto mode: generates test pattern if the input signal is lost
  - fixed mode: generates pre selected video format
- remote control of all functions via web interface with FC972 Remoter;
  - local setting of dedicated functions



## Block Diagram



## SD942 8ch SD De/Embedder

2/4

### Technical Specifications

#### VIDEO :

standard:	SMPTE 272 M-A, C	270 Mbit	SD-SDI
connection:	BNC, 75 Ohm, coaxial (SDI through: active loop, reclocked)		
signal level:	800mV $\pm$ 10%		
equalisation:	130m (Belden 1694A, 1.485GHz)		
	300m (Belden 8281 , 270 MHz)		
return loss:	>15 dB (1.485 GHz)		

---

supported video standards:

SD 525/59.94 SMPTE 125M  
SD 625/50 SMPTE 125M

---

#### AUDIO :

audio data format:	24 Bit, transparent for C-Bit and U-Bit according to AES3
audio sample rate:	48 kHz synchronous to video-carrier
latency(deembedder + embedder):	SD : < 2,6 msec
audio delay :	0...240 msec
sample rate converter:	24bit, THD < 140dB

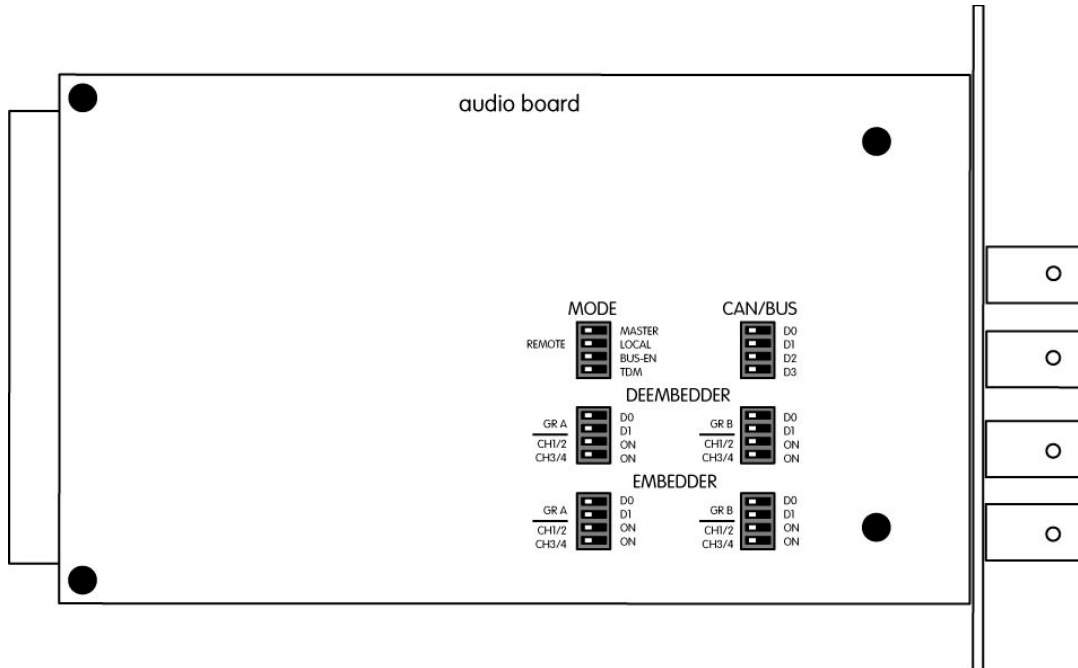
#### GENERAL :

backplane connector:	ref. to DIN41612, 64pin, a+b, male
power supply:	+5V DC
consumption:	approx. 1.000 mA
dimension:	3RU, 4HP, 175mm depth (EUROPA size pcb)
weight:	~300g
temperature:	10°C to 40°C
humidity:	90%, non condensing

# SD942 8ch SD De/Embedder

3/4

## Installation



### MASTER MODE

- When **ON**, the SD942 is clock master for the frame (this master module must be inserted in to one of the reserved slots in the rear-plane)
- SD-mode: 48 kHz audio clock is locked to 270 Mbit video carrier*
- Pattern Generator-mode: 48 kHz is locked to the video carrier*

### REMOTE / LOCAL

- In **LOCAL** mode, the DIP switch settings are valid on power up. Any previously stored settings in the module are overwritten. Buss assignments are automatically derived from the CAN address switch settings as follows:

For audio signals from any input module :

$Sx+1 = IN1/2$   
 $Sx+2 = IN3/4$   
 $Sx+3 = IN5/6$   
 $Sx+4 = IN7/8$

For audio signals to any output module :

$Sx+5 = OUT1/2$   
 $Sx+6 = OUT3/4$   
 $Sx+7 = OUT5/6$   
 $Sx+8 = OUT7/8$

*Note: This is typically not a practical working configuration, however **LOCAL** mode is useful in module testing.*

## SD942 8ch SD De/Embedder

4/4

-In **REMOTE** mode, local DIP switch settings are not valid. The module must be in **REMOTE** mode to be configured via web browser interface.

### **BUS-EN** \*\*see also *Initial Setup / Buss Assignment*

- when **OFF**, disconnects the outputs to the audio backplane busses on power up
- when **ON**, connects the outputs to the audio backplane busses on power up

*Note: This mode is most useful in initial module setup. See **Initial Setup / Buss Assignment***

### **TDM**

- when **OFF**, 2 audio channels are multiplexed per bus line
- when **ON**, 8 audio channels are multiplexed per bus line

### **CAN/BUS**

- D0 ..D3** : binary combination will set the CAN-ID of the unit from 0 to F

### **DE-EMBEDDER GROUP A / GROUP B SELECT SWITCHES**

- **D0/D1**: binary combination to set the de-embed group from 1 to 4 (setting: 0=GR1 .... 3=GR4).
- **CH 1/2, CH 3/4**: enables (ON) or disables (OFF) the channel pair in the selected group

### **EMBEDDER GROUP A / GROUP B SELECT SWITCHES**

- **D0/D1**: binary combination to set the de-embed group from 1 to 4 (setting: 0=GR1 .... 3=GR4).
- **CH 1/2, CH 3/4**: enables (ON) or disables (OFF) the channel pair in the selected group

## Initial Setup / Buss Assignment

The SD942 uses web browser interface via the FC972 Remote module to assign its inputs/outputs to the modular frame audio busses electronically (other modules make use of on-board jumper settings). Due to this, replacement spares can not be configured until they are inserted into the frame. However, this may cause conflicts in audio busses and result in disruption of existing audio signals.

To avoid audio buss conflicts when you replace an SD942, the output bus driver circuits must first be disabled. This is done by setting the **BUS-EN** DIP-Switch "OFF." When inserted into the frame, the module can be initialized which will set all parameters to factory defaults including all output busses off.

After the proper configuration is entered into the module via web interface, the module should be removed and the **BUS-EN** DIP switch set to "ON." The buss configuration will now be taken from module memory on power-up.

# HD943 8ch HD/SD De/Embedder

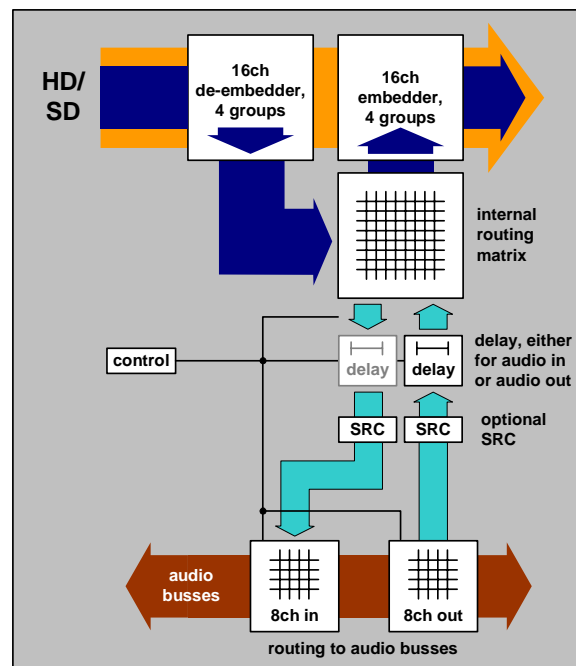
1/4

## Features

- multi-format HD/SD operation with auto-detection
- 8ch embedder/deembedder
- 2 SDI outputs
- bypass relay for SDI IN >>> SDI OUT1
- bit transparent for coded data streams (e.g. Dolby E)
- de-embedder :
  - de-embedding of all 4 groups simultaneously
  - user selectable routing of up to 8 mono channels to audio busses
- embedder :
  - user selectable embedding of up to 4 groups
  - routing of up to 8 audio channels from audio busses
- MASTER mode: system can lock to SD/HD input
- sample rate converter (optional) for non-synchronized SDI signals
- audio delay: 8 x 240 ms in increments of 1 ms
  - delay available either in de-embedder or embedder
- video test pattern generator for HD or SD:
  - auto mode: generates test pattern if the input signal is lost with the same format
  - fixed mode: generates pre selected video format
- remote control of all functions via web interface with FC972 Remoter;
  - local setting of dedicated functions



## Block Diagram



# HD943 8ch HD/SD De/Embedder

2/4

## Technical Specifications

### VIDEO :

standard:	SMPTE 299M	1,485 Gbit	HD-SDI
	SMPTE 272 M-A, C	270 Mbit	SD-SDI
connection:	BNC, 75 Ohm, coaxial (SDI through: active loop, reclocked)		
signal level:	800mV $\pm$ 10%		
equalisation:	130m (Belden 1694A, 1.485GHz)		
	300m (Belden 8281 , 270 MHz)		
return loss:	>15 dB (1.485 GHz)		

### supported video standards:

HD 720/60	SMPTE 296M	HD 1080/25	SMPTE 274M
HD 720/50	SMPTE 296M	HD 1080/24	SMPTE 274M
HD 720/30	SMPTE 296M	HD 1080/50	SMPTE 295M
HD 720/25	SMPTE 296M	HD 1035/60	SMPTE 260M
HD 720/24	SMPTE 296M		
HD 1080/60	SMPTE 274M	SD 525/59.94	SMPTE 125M
HD 1080/50	SMPTE 274M	SD 625/50	SMPTE 125M
HD 1080/30	SMPTE 274M		

all HD-standards are supported also with their 1/1001-frame-rates

### AUDIO :

audio data format:	24 Bit, transparent for C-Bit and U-Bit according to AES3
audio sample rate:	48 kHz synchronous to video-carrier
latency	(deembedder + embedder):
	HD: <800 $\mu$ sec
	SD : < 2,6 msec
audio delay :	0...240 msec
sample rate converter:	24bit, THD < 140dB

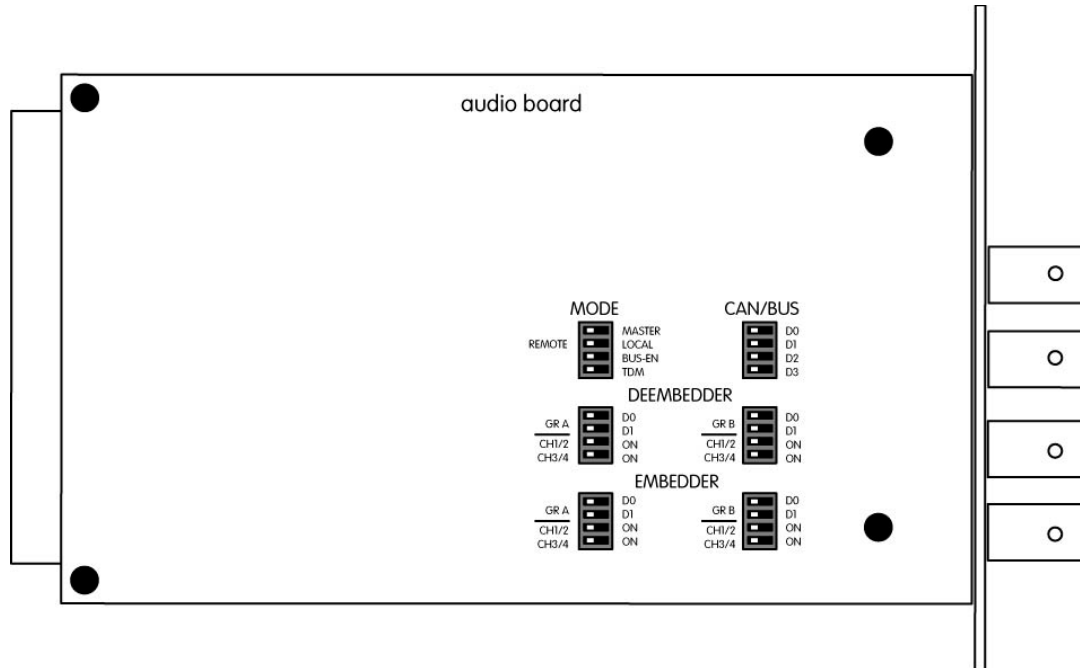
### GENERAL :

backplane connector:	ref. to DIN41612, 64pin, a+b, male
power supply:	+5V DC
consumption:	approx. 1.000 mA
dimension:	3RU, 4HP, 175mm depth (EUROPA size pcb)
weight:	~300g
temperature:	10°C to 40°C
humidity:	90%, non condensing

# HD943 8ch HD/SD De/Embedder

3/4

## Installation



### MASTER MODE

- When **ON**, the HD943 is clock master for the frame (this master module must be inserted in to one of the reserved slots in the rear-plane)
- SD-mode: 48 kHz audio clock is locked to 270 Mbit video carrier*
- Pattern Generator-mode: 48 kHz is locked to the video carrier*

### REMOTE / LOCAL

- In **LOCAL** mode, the DIP switch settings are valid on power up. Any previously stored settings in the module are overwritten. Buss assignments are automatically derived from the CAN address switch settings as follows:

For audio signals from any input module :

Sx+1 = IN1/2  
 Sx+2 = IN3/4  
 Sx+3 = IN5/6  
 Sx+4 = IN7/8

For audio signals to any output module :

Sx+5 = OUT1/2  
 Sx+6 = OUT3/4  
 Sx+7 = OUT5/6  
 Sx+8 = OUT7/8

*Note: This is typically not a practical working configuration, however **LOCAL** mode is useful in module testing.*

# HD943 8ch HD/SD De/Embedder

4/4

-In **REMOTE** mode, local DIP switch settings are not valid. The module must be in **REMOTE** mode to be configured via web browser interface.

## **BUS-EN** \*\*see also *Initial Setup / Buss Assignment*

- when **OFF**, disconnects the outputs to the audio backplane busses on power up
- when **ON**, connects the outputs to the audio backplane busses on power up

*Note: This mode is most useful in initial module setup. See **Initial Setup / Buss Assignment***

## **TDM**

- when **OFF**, 2 audio channels are multiplexed per bus line
- when **ON**, 8 audio channels are multiplexed per bus line

## **CAN/BUS**

- D0 ..D3** : binary combination will set the CAN-ID of the unit from 0 to F

## **DE-EMBEDDER GROUP A / GROUP B SELECT SWITCHES**

- **D0/D1**: binary combination to set the de-embed group from 1 to 4 (setting: 0=GR1 .... 3=GR4).
- **CH 1/2, CH 3/4**: enables (ON) or disables (OFF) the channel pair in the selected group

## **EMBEDDER GROUP A / GROUP B SELECT SWITCHES**

- **D0/D1**: binary combination to set the de-embed group from 1 to 4 (setting: 0=GR1 .... 3=GR4).
- **CH 1/2, CH 3/4**: enables (ON) or disables (OFF) the channel pair in the selected group

## **Initial Setup / Buss Assignment**

The HD943 uses web browser interface via the FC972 Remote module to assign its inputs/outputs to the modular frame audio busses electronically (other modules make use of on-board jumper settings). Due to this, replacement spares can not be configured until they are inserted into the frame. However, this may cause conflicts in audio busses and result in disruption of existing audio signals.

To avoid audio buss conflicts when you replace an HD943, the output bus driver circuits must first be disabled. This is done by setting the **BUS-EN** DIP-Switch "OFF." When inserted into the frame, the module can be initialized which will set all parameters to factory defaults including all output busses off.

After the proper configuration is entered into the module via web interface, the module should be removed and the **BUS-EN** DIP switch set to "ON." The buss configuration will now be taken from module memory on power-up.